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SECRETARY, BOARD OF
OIL, GAS & MINING

Notice of Intention
To Commence Large Mining Operations

Earth Energy Resources, Inc.
PR Spring Mine
M0470090

May 2009

Submitted by:

Earth Energy Resources, Inc.
Suite #740 404 – 6th Avenue SW
Calgary, Alberta T2P 0R9

to:

Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

Prepared in part by:

JBR Environmental Consultants, Inc.
8160 S. Highland Drive
Sandy, Utah 84093
(801) 943-4144

EXHIBIT

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DIV. OF OIL, GAS & MINING

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Introduction

Earth Energy Resources Inc. (Earth Energy) is a privately held Canadian firm engaged in the development of process technology for extraction of bitumen from naturally occurring tar sand deposits in the United States and Canada. Earth Energy holds State Institutional Trust Lands Administration (SITLA) oil sands leases on 5,930 acres in Utah's Uinta Basin, near PR Spring. The PR Spring deposits are the largest of the Uinta Basin special Tar Sand Areas defined by the U.S. Geological Survey. Within the SITLA lease areas, Earth Energy has defined a 2,255-acre Study Area for the PR Spring Mine. The initial mine development under this NOI will take place in the southeastern part of this Study Area on approximately 213 acres (referred to throughout this NOI as the Affected Area) (See **Figures 1** and **2**). The Affected Area is equivalent to the area that will be disturbed and the area that will be bonded for and reclaimed. The remaining 2,042 acres within the Study Area were the subject of environmental data collection efforts, but will not be subject to disturbance under this NOI. Should additional mine development be planned in the future, beyond that described herein as occurring on the 213-acre Affected Area, permit amendments or revisions would be required. These amendments or revisions would address any expansion that would occur, including details on any needed re-handling of materials, alterations to the processing plant, etc. Conditional Use Permits (CUP) for the mine from Uintah and Grand Counties are included in Appendix B.

Earth Energy has patented a chemical method for extraction of hydrocarbons from oil sands. Known as the Ophus Process, this production method produces clean (inert), "damp-dry" sand tailings that can be backfilled into the quarry. The planned sequence of exploration and pilot processing and production tests underway are intended to refine and adapt the process to fit the unique characteristics of the Utah PR Spring deposits. Oil (tar) sands in Utah vary significantly from the oil sand deposits and extraction methods commonly used in the Athabasca oil sands of Alberta.

Earth Energy conducted exploration drilling in spring of 2005 under Exploration Permit (E/019/052), Earth Energy PR Spring 1 Project (less than ½-acre disturbance). Additional drilling was conducted under Exploration Permit (E/019/053) within a 100-acre area along Seep Ridge Road. These programs included twenty-five 4-inch diameter holes drilled to depth of 50 to150 feet on 30-foot by 30-foot drill pads located on drill roads or adjacent to the main Seep Ridge Road. The drilling programs were used to select the 5-acre mine site for the fall 2005 production test conducted under a Small Mine Permit, Leonard Murphy #1 (S/019/059).

Other geophysical activities have been ongoing in a small portion of Earth Energy's lease area. These existing rights and activities ongoing in the area are described below in Section 104.2.

Drilling and geophysical work planned for 2009 will provide grade-thickness data of the tar sand beds necessary for detailed planning, permitting, site development and mining to go forward.

R647-4. Large Mining Operations

R647-4-101. Filing Requirements and Review Procedures

101. As is required of the party that is planning to conduct large mining operations, this NOI is submitted by Earth Energy Resources, Inc. for review and Division approval.

2. The Division has 30 days from the last action on the NOI to approve/deny the NOI, and then to publish a Notice of tentative decision in accordance with R647-4-16.

3. As stated at R647-4-101.3, upon Division approval of the NOI and execution of the Reclamation Contract by Earth Energy, both the Division and Earth Energy will be bound by the NOI and implementing regulations, and Earth Energy will be able to begin mining. Earth Energy understands that execution of the Reclamation Contract is not complete until the contract and the surety receives Division approval; only then can mining commence. Further, Earth Energy explicitly commits to conform to all of the operation and reclamation practices that are described in this NOI and that are required by all applicable regulations at R647-4.

4. Earth Energy will provide notification to the Division within 30 days of starting mining operations.

5. Earth Energy's LMO is greater than 50 acres, for purposes of calculating permit fees. Fees are due annually by the last Friday in July unless the NOI is closed out under R647-4-101.5.13.

R647-4-102. Duration of the Notice of Intention

It is understood that, when approved, Earth Energy's NOI, including any subsequently approved amendments or revisions, remains in effect for the life of the mine.

R647-4-103. Notice of Intention to Commence Large Mining Operations

Earth Energy's NOI addresses the requirements of the rules listed in this section as follows:

104. Operator(s), Surface and Mineral Owner(s)
105. Maps, Drawing, and Photographs
106. Operation Plan
108. Hole Plugging Requirements
109. Impact Assessment
110. Reclamation Plan
112. Variance

Under this section, rules at 107 and 111 are not required to be addressed; however those subjects are covered within the NOI in other sections.

R647-4-104. Operator(s), Surface and Mineral Owner(s)

104.1. Operator Responsible for Mining Operations/Reclamation of the Site

MINE NAME: PR Spring

NAME OF PERMITTEE/ OPERATOR/ APPLICANT: Earth Energy Resources, Inc., a Corporation registered to do business in the State of Utah.

Business License #:	5834125-0142	
Registered Agent:	Daniel A. Jensen	
Address:	185 South State Street, Suite 1300 Salt Lake City, UT 84111	
Phone:	801-532-7840	Fax: 801-532-7750
E-mail address:	daj@pwlaw.com	

PERMANENT ADDRESS: Earth Energy Resources, Inc.
Suite #740, 404 – 6 Avenue SW
Calgary, Alberta T2P 0R9
Phone: 403-233-9366 Fax: 403-668-5097

COMPANY REPRESENTATIVE: Barclay Cuthbert, Vice President, Operations

Address:	Suite # 740, 404 – 6 Avenue SW Calgary, Alberta T2P 0R9	
Phone:	403-233-9366	Fax: 403-668-5097
E-mail address:	barclay.cuthbert@earthenergyresources.com	

LOCATION OF OPERATION: Uintah and Grand Counties, Utah (the CUP's are attached in Appendix B.)

Universal Transverse Mercator (UTM) Coordinate System: UTM Datum NAD27 4369592 km Northing, 645187 km Easting, Zone 12

Sections: T. 15 S., R. 23 E., SLB&M, Uintah County, Sections 35 & 36.
T. 15.5 S., R. 24 E., SLB&M, Grand County, Sections 31& 32.

The Uintah County portion of the operations will be on lands under Indian Jurisdiction (tribal land but not part of an Indian Reservation). As such, certain aspects of environmental permitting for the PR Spring Operation will be handled by the Environmental Protection Agency (EPA) rather than Utah's Department of Environmental Quality.

104.2. Surface and Mineral Owners of All Lands to be Affected

OWNERSHIP OF THE LAND SURFACE: Utah State Institutional Trust Lands Administration.

OWNERS OF RECORD OF THE MINERALS TO BE MINED: SITLA (Earth Energy has lease rights to mine up to a 500-foot depth below ground surface)

BLM LEASE OR PROJECT FILE NUMBER(S): None for the mine operation. A BLM right-of-way (No. UTU-86004) has been approved and offered to allow construction of the appurtenant water well and pipeline. Correspondence with the BLM on this issue is included in Appendix B. (This pipeline also crosses SITLA land and the well/pipeline process is permitted by DOGM under Exploration Notice #E0190053)

ADJACENT LAND OWNERS:

Canyon Gas Resources, LLC – Natural Gas Pipeline Right of Way
7400 East Orchard Rd., Suite 30025, Englewood, CO 80111

Uintah County - Road 2810 Right of Way
147 East Main St.
Vernal, UT 84078

Bureau of Land Management, Vernal Field Office
170 South 500 East
Vernal, UT 84078

Township 15 South, Range 23 East, SLB&M

Section 26:

Grazing Permit 20905:	Alameda Corporation PO Box 22608 Houston, TX 77227-2608
Mineral Lease 49944:	EOG Resources, Inc. PO Box 4362 Houston, TX 77210-4362

Section 27:

Grazing Permit 20905:	Alameda Corporation PO Box 22608 Houston, TX 77227-2608
Mineral Lease 49280:	Robert L. Bayless Producer LLC 621 17th Street Ste. 1640 Denver, CO 80293

Section 28:	
Grazing Permit 20905:	Alameda Corporation PO Box 22608 Houston, TX 77227-2608
Mineral Lease 49280:	Robert L. Bayless Producer LLC 621 17th Street Ste. 1640 Denver, CO 80293
Section 33:	
Grazing Permit 20905:	Alameda Corporation PO Box 22608 Houston, TX 77227-2608
Grazing Permit 21202:	Burt De Lambert PO Box 607 Vernal, UT 84078-0607
Mineral Lease 49281:	Robert L. Bayless Producer LLC 621 17th Street Ste. 1640 Denver, CO 80293
Section 34:	
Grazing Permit 20905:	Alameda Corporation PO Box 22608 Houston, TX 77227-2608
Grazing Permit 21202:	Burt De Lambert PO Box 607 Vernal, UT 84078-0607
Mineral Lease 49281:	Robert L. Bayless Producer LLC 621 17th Street Ste. 1640 Denver, CO 80293
Section 35:	
Grazing Permit 20905:	Alameda Corporation PO Box 22608 Houston, TX 77227-2608
Mineral Lease 49944:	EOG Resources, Inc. PO Box 4362 Houston, TX 77210-4362
Section 36:	
Grazing Permit 20995:	Alameda Corporation PO Box 22608 Houston, TX 77227-2608
Mineral Lease 49944:	EOG Resources, Inc. PO Box 4362 Houston, TX 77210-4362

Township 15.5 South, Range 24 East, SLB&M
Section 31:

Grazing Permit 20905:	Alameda Corporation PO Box 22608 Houston, TX 77227-2608
Grazing Permit 21202:	Burt De Lambert PO Box 607 Vernal, UT 84078-0607
Mineral Lease 49572:	Moose Mountain Land Company 935 E South Union Avenue Suite D-202 Midvale, UT 84047

Section 32:

Grazing Permit 20905:	Alameda Corporation PO Box 22608 Houston, TX 77227-2608
Mineral Lease 49572:	Moose Mountain Land Company 935 E South Union Avenue Suite D-202 Midvale, UT 84047

HAVE THE LAND, MINERAL, AND ADJACENT LANDOWNERS BEEN NOTIFIED IN WRITING? The adjacent owners (BLM and SITLA) will be notified in writing once this NOI is tentatively approved (those agencies are both currently aware that the project is pending), and those agencies will notify other land users or right-of-way holders as they deem appropriate.

DOES THE PERMITTEE/ OPERATOR HAVE LEGAL RIGHT TO ENTER AND CONDUCT MINING OPERATIONS ON THE LAND COVERED BY THIS NOTICE? Yes.

104.3. Federal Mining Claims or Lease Numbers

There are no Federal mining claims or permits.

A summary of lands under lease to Earth Energy is provided in Appendix A.

R647-4-105. Maps, Drawings and Photographs

105.1. USGS topographic base maps, as well as other select figures in the NOI) provide the following information:

1.11 Property boundaries of surface ownership.
1.12 Water features (including streams and springs), infrastructure, and surface/subsurface facilities within 500 feet of mining operations.
1.13 Access routes.
1.14 Previous mining/exploration impact in the disturbance area is shown on Figure 2.

105.2. Surface facilities maps (Figures 2 and 3) include the following information:

2.11 Surface facilities
2.12 Disturbance boundary

105.3. Other maps that may be required:

3.11 There would be no re-graded slopes to be left steeper than 2H:1V
3.12 Plan, profile, X-section of any earthen structures to be left as part of post-mining land use.
3.13 There would be no water impounding structures >20 feet high.
3.14 There are no areas that will be left un-reclaimed as part of the post-mining land use.
3.15 There will be no diversion channels constructed.
3.16 Geology, tar sands cross sections, water features and vegetation communities are shown on Figures 5, 6, 7, and 8, respectively.
3.17 Reclamation treatments are shown on Figure 9.
3.18 Mine plan cross sections are provided as Figures 4a, 4b, and 4c.

105.4. Site photographs are included in Appendix F.

105.5. No underground development will occur: Surface mine development is shown on Figure 2.

R647-4-106. Operation Plan

106.1. Mineral to be Mined

The type of mineral to be mined is tar sand. The tar sands occur generally in lenticular beds, with interbedded sandstone, siltstone, shale, mudstone and calcareous marl. The tar sand beds have been defined as the 'D' or upper bed, and the 'C' or secondary bed. Tar sand beds below the C bed are not as well defined based upon drill logs, resistivity testing and modeling. Although current mine plans under this NOI are to a depth of approximately 145 feet, the maximum lease depth is 500 feet.

106.2. Operations to be Conducted

Throughout operations at the PR Spring location, Mine Safety and Health Administration (MSHA) safety requirements and guidelines will be followed, and the operating plan as described in this document will be followed. While operations include both pit backfilling and the use of external overburden/interburden storage areas, where conducive to properly sequenced ore bed depletion and efficient material handling (after threshold opening pit size is established), clean produced sand/clay fine tailings will be preferentially replaced in the depleted mine areas versus discharged in overburden dumps. Further, operations covered in this NOI will minimize any re-handling of material as operations expand. The overburden/interburden storage piles are located in areas devoid of oil sand, and pits will be depleted before refilling and reclamation commence. Surface facilities are constructed on oil sand bearing areas, but these areas are limited; and relocation of the plant facility and ultimate development of the underlying bitumen resource is incorporated within future expansion plans, for which additional permitting would be needed.

The acreages associated with the individual components of these operations are described in Section 106.3. The types of operations to be conducted include the following:

SURFACE PREPARATION/ STORAGE OF OVERBURDEN AND TOPSOIL

Surface preparation will include the clearing of vegetation and removal of topsoil for storage in designated topsoil storage areas, as described further in Section 106.5. Larger vegetation would be cleared by crushing, then pushing into slash piles. This material will be stockpiled within or on top of the salvaged topsoil, or used to form berms surrounding the topsoil piles (see Section 106.6); the estimated volumes of both topsoil and vegetative matter are also provided in Section 106.6. All of this vegetative matter will be redistributed along with the

topsoil during reclamation in order to provide organic matter and help with surface roughness and soil moisture retention.

Where overburden must be removed, it will be scraped and deposited in the overburden/interburden storage areas shown on Figure 2. As mining proceeds, overburden and interburden, along with produced sand from extraction operations, will be back-hauled and re-contoured in the mined pit. These operations are discussed in more detail under the overburden/interburden storage areas and pit backfill subheadings below.

Access Roads

The main access to the PR Spring Mine site is via Uintah County Road 2810 (Figures 1 and 2). Onsite access roads to the mine pit and facilities area (Figure 2) have been designed to minimize grade. In general, they are located around the perimeter of the Affected Area, serving to confine disturbance and manage runoff. In part, these roads cross -- and are integral to -- the overburden/interburden storage areas. In those cases, those road segments will not be constructed until they are needed to access those features. Access roads will be surfaced with crushed overburden (rock) material and maintained with a grader and water truck. In total these roads will be approximately 13,050 feet in length by 80 feet wide.

Mining

Mining will be conducted using a self-contained mobile surface mining machine (e.g. Wirtgen 2200SM Surface Miner). Overburden and interburden will be removed by conventional drill/blast/muck or rip/muck methods. Initially, overburden will be removed on five acres of the initial mine site to expose the uppermost layer of oil sand. The surface miner will then mine through the first layer of oil sand by successively planing 8 to 10 inches of oil sand per pass. When the initial layer of oil sand has been mined, the interburden layer will be exposed and this will be removed to expose the next layer of oil sand.

As oil sand mining is taking place with the surface miner, the conventional mining equipment will be employed for concurrent overburden removal to expose new areas of the oil sand bed and allow oil sand mining to progress. As sufficient area comes available, the mining operation will transition to multiple benches of mining, where oil sand mining occurs on the top layer of newly exposed areas and previously mined areas are excavated to expose the next bed of oil sands. When all target oil sands beds have been mined and access to newly opened areas is established, backfilling of the depleted areas will commence.

Overburden and or interburden may be sufficiently friable to allow removal by ripping with dozers, rather than require blasting. However, where blasting is required to facilitate material removal, each program will be designed as a controlled blast, with adequate stemming to eliminate fly-rock, and minimize

vibration and dust, while generating aggregate size conducive for removal from the mine area. The drill size, spacing and depth of blast holes, and the frequency of blasting, will vary depending upon the situation, but in all cases will be in accordance with local, state and federal rules. Peak particle velocities of any initial blasting operations will be monitored and appropriate blasting protocols refined at the time blasting commences. As typical for these types of operations, a series of test blasts will be monitored to determine the resultant peak particle velocities at specified distances from the blasting area. Blasting will not result in fly rock landing on the adjacent county road. However, warning signs advising the public of blasting protocols will be posted at 150-foot intervals along the fence line, placed at all ready access points, and in any other locations required by MSHA. These signs will include blasting schedules.

Regular and routine inspections will occur throughout the mine area to ensure that operating conditions remain safe, that MSHA safety guidelines are being followed, and that the mining plan stated herein is being followed. This will include inspections to verify that the pit wall slopes are at the correct angles and that they remain stable.

Equipment

Mining equipment will consist of the Wirtgen Surface Miner noted above, trackhoes, dozers, graders, rock drill, loader, water truck, and service trucks. Mining is anticipated to be conducted during the day shift only. A complete list of mining equipment is included in Appendix D.

Mined tar sands will be hauled to the process plant (Figure 3) and either discharged directly to the inlet hopper of the crusher (which is integral to the process train structure) or alternately placed in a storage pile adjacent to the processing facility for feed to the inlet hopper during the night shift. Generally, a two-week reserve supply of ore will be maintained in stockpiles at the processing facility. The mined tar sands storage pile or piles (also known as the reserve ore pile) is not expected to exceed 40,000 yd cubic yards at any time and is typically expected to amount to 30,000 cubic yards of ore. The dimensions of this pile (or combined smaller piles) will not exceed 100 yards by 100 yards by 4 yards in height

It is expected that the mining process will intercept shales and sandstone in addition to the tar sand beds. Interburden material will be placed in the overburden/interburden storage areas defined on Figure 2 and used as pit backfill. These operations are described below.

Pit Design

The 62-acre initial mine pit is delineated on Figure 2, and is designated as the North (Opening) Pit. It is designed with a perimeter highwall, which in all locations (during operations) will be higher than the highest elevation of the pit floor. In this manner, all precipitation falling within the mine pit boundaries will

collect within precipitation collection sumps located in the bottom of the pit and thereby prevent runoff from leaving the mine site. These collection sumps are simply low areas within the working mine pit where precipitation falling directly within the pit perimeter will drain and collect. The accumulated precipitation will be removed from the pit along with the solid materials and processed along with the bitumen bearing sands. As needed, it will also be pumped from the mine and used for dust suppression on mine and plant roads. The active mining area will be a pit at all times (concave to incident precipitation). No pit configurations are planned where storm water will be allowed to egress the active mine workings. Further, the highwall safety berms will prevent runoff from outside the pit perimeter from entering the pit (the pit's location atop the slope minimizes this potential even without the presence of the safety berms).

The pit will be mined at an operating pit slope of 2H:1V. The planned pit design configuration can be achieved using the above-noted mining methods. In addition, the planned pit design will be geotechnically stable and will not create any safety or environmental concerns. Use of 2H:1V pit slopes represents Earth Energy's desire to facilitate pit reclamation, and to provide conservatively designed slopes to compensate for the lack of detailed knowledge regarding the extent of localized faulting or fracture planes that could cause instabilities at steeper slopes than will be used. Site-specific information indicates that much steeper slopes could be justified: numerous existing road cuts and excavations in the area (including Earth Energy's 2005 production test pit) are stable with slopes steeper than 1H:1V. The use of 2H:1V pit wall slopes will also prevent rock falls. Back-break near the highwall will be controlled or eliminated by smooth transition grading. Any required blasting along the highwalls of the pit will be accomplished with small controlled blasts to eliminate over-break and weakening of the remaining material on the face of the slope.

The North (Opening) Pit has approximately 7.9 million cubic yards of material to be mined. Of this, approximately 10-12 percent (by weight of ore) is processed out as bitumen product, which leaves 3,944,228 cubic yards of processed sand that will be disposed of (along with 3,506,465 cubic yards of overburden and interburden as described below). Applying a bulkage factor of 1.3 to the over/interburden and processed sand, this will result in 9.7 million cubic yards of waste material to be disposed of. Filling overburden/interburden storage areas 1 and 2 to their maximum capacity of 4.9 million cubic yards will result in approximately 4.8 million cubic yards to be back-filled in the mine pit.

After the North (Opening) Pit is mined, and assuming that conditions are favorable, Earth Energy would extend mining to the southwest, to a contiguous area designated at the West Pit. Details on the West Pit design are conceptual at this stage; once coring has been accomplished and analyzed, this pit design will be developed more fully. These details will be submitted to DOGM as a Plan Amendment prior to the initiation of mining. At this time, general estimates

as needed to provide bonding calculations have been made; these will also be revised as needed and provided in a subsequent amendment.

Anticipated yearly mined tonnages include: 920,000–1,200,000 tons of oil sand ore mined per year and 1,000,000–1,400,000 tons of overburden/interburden mined per year. The life of the mine is expected to be between 6 and 13 years for both the North (Opening Pit) and the West Pit, depending on the amount of time the processing equipment is on-stream and the number of process trains employed. (Only one process train is covered under this NOI; should additional trains be needed, they would be covered in a permit amendment.) Expansion into the West Pit may occur in the future depending upon numerous factors; at this time, the best estimate of when that might realistically occur is approximately 5 years after the North (Opening) Pit mining has begun.

Hauling

Mined ore will be hauled via the main haul road to the process area and either discharged directly to the inlet hopper of the process unit or placed in a temporary storage pile (see above for pile size information) for off-shift processing. The distance from the approximate center of the North (Opening) Pit to the plant is approximately 2,000 feet. Figure 3 shows the location of the temporary storage pile; the inlet hopper feeds to the east end of the process train, which is also shown on Figure 3.

PROCESSING

General Facility Description

The processing facility will be located adjacent to Uintah County Road 2810 in the area shown on Figure 3. As shown on this plant site diagram, this would be an area of approximately 15 acres including a mine office and associated parking area; a maintenance shop, warehouse, power plant, equipment parking and service area; process equipment, sand de-watering equipment, a tank farm, tank truck loading area, and water retention/storage pond; and stockpiles for processed sand, reject materials (ore loads that contain too much interburden or overburden to be viable for processing), and ore.

The tank farm will be constructed with secondary containment sufficient to meet applicable Spill Prevention Control and Countermeasure Plan (SPCC) regulations for tank farm construction (total volume of the bermed area greater than 110% volume of the largest tank contained in the farm, for example). Tanks will be erected on compacted gravel bases underlain by impermeable (HDPE) liners to prevent migration of spilled or leaked hydrocarbons off of the plant site. HDPE liners will be integrated with secondary containment berms.. The SPCC Plan will cover new and spent fuel, oil, and lubricants, as well as any other hydrocarbons including the processed bitumen. If any hydrocarbon spills occur during mining these will be dealt with as outlined in the SPCC Plan. Other non-hydrocarbon liquids will be similarly managed.

The remainder of the plant site will be constructed to be a self-contained area, through the use of perimeter berms or ditches where needed. The specific locations where berms will be used, as opposed to where ditches will be used, will be determined during final site design and will be based upon best engineering practices. These locations will be indicated on the final site design drawings, which will be submitted to DOGM once they are available as replacement drawings to take the place of the conceptual drawings currently herein. All ditches will be designed to pass the 10-year, 6-hour precipitation event. They will be triangular in cross section with side slopes approximately 2H:1V; depth including freeboard will be less than 2 feet or equivalent in cross section. Berms will generally be 2 feet high, with a two-foot top width and 2H:1V side slopes. Final designs for these structures will be produced concurrent with final engineering designs, and will be submitted to DOGM. However, standard engineering practices will be used to determine these final designs: for example, riprap will be used when or if modeled design runoff velocities indicate that riprap is needed to maintain the structure integrity. All precipitation incident on the site will be collected in the water retention/storage pond located at the low point of the plant site (See Figure 3 for pond location). As the PR Spring operation is located primarily along a fairly flat interfluve with little or no up-gradient, off-site runoff flowing onto the site, the pond will collect only runoff generated from precipitation falling upon the plant site itself. It will also be used to store fresh make-up water, however no process water will be routed to this pond. Any sediments collected in the pond will be removed as needed in order to maintain its design capacity. It will be designed to contain the runoff from the 10-year, 24-hour precipitation event as well as sediment storage and make-up water. The pond would also be HDPE-lined to prevent loss to infiltration (it is not needed as a water quality protection measure). Once final designs are completed, this information will be submitted to DOGM.

The mine office will be a modular building placed on a gravel pad. The process equipment will be skid-mounted and also located on gravel pad, as would the parking areas. The warehouse and maintenance shop will be 'Sprung-type" semi-permanent structures on concrete pads. A list of equipment, buildings, and tanks planned for use in the facilities area is included in Appendix D.

The facility would operate 24 hours per day, approximately 350 days per year, not including unscheduled shutdowns/outages.

Process Flow Details

The process train is designed to accommodate 3,000-3,500 tons of ore per day, producing approximately 2,000 bbl/day of bitumen. The extraction process begins when the mined and conditioned tar sand ore is sent through a crusher/ delumper and reduced to a 2 inch-minus aggregate size. From there, the crushed ore is augered or conveyed to a heated slurry mixer where the cleaning emulsion is introduced and the ore slurried to the consistency of a thick gritty

milkshake. The oil sand slurry is then moved by screw conveyor to the slurry tank where primary separation of the bitumen from the sand occurs. The produced sand with residual bitumen is then pumped through a series of separation towers where the last traces of bitumen are removed. All of the liberated bitumen is captured, polished with cyclones and/or centrifuges and then pumped to a storage tank. The cleaning chemical is then removed from the bitumen by distillation and recycled to the front of the process. Produced bitumen is pumped to a product (sales) tank for heated storage prior to transport.

The clean produced sand is de-watered on a shale shaker (or similar device) and the recovered water is pumped to a holding tank for recycling to the front of the process. Additional cleaning agent is added to the recycled water to bring it back to full strength. De-watered sand and clay fines are then conveyed to a stockpile for loading and backhaul to the mine pit. At this point, the discharged sand and clay fines contain between 10 and 20 percent water.

Water is expected to be consumed at a rate of approximately 1.5-2 barrels for each barrel of produced bitumen. The 2,000 bbl/day operation would use approximately 4,000 barrels of water, or 116 gallons per minute (gpm) based upon 24-hour processing. The majority of the water "consumed" in the process is simply returned to the environment as un-recoverable entrained moisture in the pore spaces of the produced sand and clay fines. All of this residual water is anticipated to evaporate from the loosely consolidated produced sand/fines mix with no free-water run-off. (This subject is described in greater detail in Appendix B, within correspondence requesting Permit-by-Rule coverage under the Utah Division of Water Quality's (DWQ) groundwater protection program.) The process flow diagram is included in Appendix D.

Process Chemical Storage & Handling

The process chemical, in its neat form (without additives), will be transferred from the distillation unit into storage tanks noted on Figure 3, and from the storage tanks to the blending area using appropriate pumps to mitigate the risk of fire or explosion. These factors will be considered fully during engineering of the commercial production unit. There are no other waste streams that might get into the solids or tailings and the chemical is not changed as a result of processing – it acts as a diluent and a cleaning agent, but is not itself altered by bitumen extraction operations.

The process chemical is stable, colorless, evaporates rapidly when exposed to air, and has negligible solubility in water. (This subject is described in greater detail in Appendix B, within correspondence requesting Permit-by-Rule coverage under the Utah Division of Water Quality's (DWQ) groundwater protection program.) When blended into the cleaning emulsion form required for use in the process stream, it has low flammability and presents low risk. The cleaning emulsion's biodegradability has not been determined, but related

chemicals are known to be biodegradable. It will be stored and handled according to regulation.

Power Source

Generators located at the plant site (one natural gas, one diesel) will be used to supply all the electrical requirements for the process train. Under Exploration Notice #E0190053, a three conductor, heavy gauge, armored power supply cable will be buried in the water line trench (described below) to convey power to the nearby water well.

Water Source

Water for processing would be obtained from a well drilled nearby on BLM land, and piped to the site along existing roadways (Figure 2). Correspondence with BLM and the State Engineers Office regarding right-of-way and approval to drill the well are included in Appendix B.

The well is expected to be completed in aquifers that are approximately 1,000 – 2,600 feet below the surface; ground elevation at this location is approximately 8,260 feet. The well would have a bore diameter of 12 inches and would be cased with 12-inch diameter steel casing pipe that is perforated in the water bearing sandstone aquifers. It would be housed within an 8-foot by 8-foot frame building, located on a concrete pad, and surrounded by a chain link fence.

The supply pipeline will be 12,650 feet in length and constructed of 6-inch HDPE pipe. It will be buried to a depth of 5-6 feet for insulation and protection, except at crossings, where it will be buried to a depth of 8-10 feet. The line will be sized and rated to supply 223 gpm at less than 100 pounds per square inch. It will be fitted with valves, hydrants, and air intakes. The initial trench width will be 12-24 inches wherever possible, though in certain areas may need to be wider as required by ground conditions; BLM right-of-way covers a 15-foot corridor width. A three conductor, heavy gauge, armored power supply cable will also be buried in the trench to supply power to the well, as noted above. Gauges will be installed in the pipeline during construction so that any leaks can be detected. Note that the well and pipeline are permitted separate from this NOI, and the above description is provided for descriptive purposes only.

At the terminal end (the plant site), water would be stored onsite in a lined pond adjacent to the tank farm, as shown on the Plant Site diagram (Figure 3); it may also be stored in tanks, which would be outfitted with manifolds and valves. The pond will be lined with a synthetic (HPDE) liner simply to retain water; this lining is not required for any water quality purpose and any infiltration of contained water due an inadvertent leak or tear would not impact surface or groundwater quality.

A 360 acre-foot portion of water right number 41-3523 has been allocated to Earth Energy from the Uintah County Water Conservancy District. A copy of the agreement is contained in Appendix B.

PIT BACKFILL

As mining progresses in the North (Opening) Pit, produced (clean) sand will be used to backfill it. It is estimated that 20 to 25 percent of the 62-acre pit would need to be open in order to begin backfilling. Dump points will vary as needed in order to fill the pit at the desired sequence. Detailed mine plans are developed to ensure that the produced (clean) sand is replaced in the pit in a sequential layered and compacted manner to eliminate potential slope stability concerns.

The discharged sand will contain 10 to 20 percent water and less than 4,000 ppm residual hydrocarbons (principally near-inert asphaltenes). The blended solid tails will have an overall moisture content of about 15 percent (80-85% sand at 12-15% moisture content, 15-20% fines at 20% moisture content) and will be a relatively plastic material that will readily compact to a load-bearing surface for operation of the haul trucks. The "sand" fraction of the tails can be characterized as primarily quartz material in the 80-1,000 µm range (d_{50} = 117 µm), and the "fines" fraction is the sub-80 µm (d_{50} = 18 µm) material comprised of quartz, shale and clays. The density of the damp sand is roughly 2,850 pounds per cubic yard. The nature of the pit backfill materials are described in greater detail in Appendix B, within correspondence requesting Permit-by-Rule coverage under the Utah Division of Water Quality's (DWQ) groundwater protection program.

When the logistics of the mine/truck haul are optimized in the early stages of operations, it is anticipated that over/inter-burden materials from adjacent removal operations will be alternately combined (blended) with the sand tails to result in a stable, compactable, bulk replacement material. Thus, when placed in compactable lifts (compaction primarily from haul trucks), the replacement material will be a more homogenous mixture. Drainage from this fill will be comparable to in-situ materials. The noted level of moisture content of the blended solids tails is near optimal for compaction and will not lead to liquefaction. Blended sand/clay fine tailings will be placed in relatively thin lifts (estimated at 1-3 feet) and in conjunction with the arid climate of the mine area, the deposited tailings will readily dry out to even lower ultimate moisture content. Pore water pressures will not be a concern. In addition to promoting maximum drying, the specified lifts will enhance compaction and subsequent stability.

The volume of the North (Opening) Pit is 7,900,000 cubic yards and approximately 4.8 million cubic yard of overburden, interburden, and tailings (sand and fines) will be replaced in this pit. A bulkage factor of 30 percent has been applied to the replaced material in replacement volume calculations even though commingled produced sand and fines replaced in the pit will compact to a much lower bulkage factor (estimated to be less than 1.1). Upon completion of a pit backfill, that area

of the pit will be reclaimed. As described in the Reclamation Section below, final pit slopes angles will be 2.5-3H:1V; during operations, maximum slope angle will be 2H:1V.

OVERBURDEN/INTERBURDEN STORAGE AREAS

During initial mine development, where overburden and interburden must be removed, it will be scraped and deposited in one of two overburden/interburden storage areas shown on Figure 3. The material will primarily consist of broken sandstones and shales mixed with lesser amounts of fines, Grain sizes will vary from fine to coarse rock rubble (run-of-mine) materials potentially as large as one cubic yard. Once mining has opened a large enough excavation to allow equipment movement and backfilling, these storage areas will no longer be used; instead these materials will be re-deposited in the pit along with the clean produced sand tailings. The volume of overburden and interburden placed in these two overburden/interburden storage areas combined will be approximately 4.9 million cubic yards.

Both of the overburden/interburden storage areas will be constructed outside of the pit limits on the side-slopes of ephemeral draws above Main Canyon. The overall slopes of the land on which the overburden/interburden storage areas will be constructed ranges from 16.5 to 40 percent (10° to 22°). During mining, these overburden/interburden storage areas will be sloped at the angle of repose: 1.5-1.7H:1V (30° to 34°). Upon reclamation the slopes will be graded down to between 2.5H:1V to 3H:1V (18° to 22°). Overburden/interburden storage area No. 1 will be constructed on a 40 percent slope (2.5H:1V) that is concave, grading to a slope angle of about 10 percent (10H:1V) near its base. Overburden/interburden storage area No. 2 will be constructed on a 6H:1V slope. Both overburden/interburden storage areas will be designed and constructed to be stable within standard engineering parameters. Dump points will vary with time and will be chosen to facilitate the desired end configuration as described in this plan. While it will not be necessary to key overburden in to the slopes in all locations or as a matter of general design, on the steepest areas of overburden placement, the toes of fills may be keyed into existing slopes as deemed necessary in the field at time of placement. Exposed faces will be protected with coarse/low sediment potential material, effectively armouring the faces.

Initially produced sand tailings will be impounded in storage cells constructed of coarse overburden materials in the upper reaches (flattest) areas of the overburden/interburden storage areas (Figure 2a). Tailings containment cells will not be constructed on slopes steeper than 20 percent (11 degrees). 15-20 foot high cells will be constructed as compacted berms of overburden material and then filled with commingled clean sand/clay fine tailings. When the first level of cells is filled to capacity, successive tiered levels will be constructed until the mine pit has sufficiently advanced to permit direct replacement of the tailings back into the mine in the method described above. Five to six levels of tiered cells are

anticipated to be required before backfilling of the mine pit can be undertaken. Finished containment cells will prevent erosion of the fine tailings and result in a stable fill structure. Tailings storage in the upper reaches of the overburden/interburden storage areas will ultimately become fully encapsulated within the finished and reclaimed overburden/interburden storage areas.

The top surfaces of these storage areas will be maintained with a very slight grade away from the outslope so as to minimize runoff running over the outslope, thus controlling erosion. Runoff generated from the outslopes of the overburden/interburden storage areas will be controlled by facing the steepest sections of the finished slopes with coarse overburden material and dedicated armoring placed within the contact between the pile and the native slope (essentially forming a triangular channel-type feature), and by installing a rip-rapped energy dissipater at the toe (Figure 2b). Broken rock material has a very low siltation potential and will effectively encapsulate the finer material initially placed in the upper reaches (flatter areas) of the overburden/interburden storage areas, as noted above. The coarser materials will typically end up near the toe of the expanding fills as the dump sites are filled to their maximum capacity. The concentration of coarse materials at the toe of the fills provides a natural energy dissipater for storm runoff from the faces of the dumps. Typical design drawings are included in Figure 2b. These structures, as with all site best management practices (BMPs), will be maintained to ensure that they are functional. See further discussions below in Section 109.4.

When the overburden/interburden storage areas are filled to capacity, their exposed faces will be contoured (to an overall slope of 2.5-3H:1V) to blend in with adjacent canyon wall slopes as indicated on the Reclaimed Mine Contour Plan (Figure 9). Short segments within the overall slope will be steeper than the overall slope, however no portion of the reclaimed slopes will be steeper than 35°. Both the overall slope and any individual slope segments will be well below 45°.

106.3. Disturbance

The following acreages will be disturbed by mining (see Figure 2 for their locations):

Table 1: Disturbance Areas

Facility	Area
Plant Site including Office and Processing facilities	15 acres
Plant perimeter road	5.5 acres
Haul Road Segment #1	5.5 acres
Haul Road Segment #2	0 acres*
Haul Road Segment #3	3.0 acres

Facility	Area
Haul Road Segment #4	0 acres**
Haul Road Segment #5	3.0 acres
North (Opening) Pit	62 acres
West Pit	31 acres
Overburden/interburden storage area 1	36 acres
Overburden/interburden storage area 2	34 acres
Topsoil storage areas	18 acres
Total	213 acres

* Acres for Haul Road Segment #2 are integral to Overburden/interburden storage area 1;
** Acres for Haul Road Segment #4 are integral to Overburden/interburden storage area 2.

Table 2: Disturbance by Year (approximate)

Year	Planned Disturbance (acres)	Type of Disturbance	Cumulative Disturbance (acres)
Year 1	100	Plant site, roads, topsoil storage, portion of North (Opening) Pit, portion of overburden/interburden storage areas	100
Year 2	30	Expansion of North (Opening) Pit, expansion of overburden/interburden storage area	130
Year 3	35	Expansion of North (Opening) Pit, expansion of overburden/interburden storage area	165
Year 4	15	Expansion of overburden/interburden storage area	180
Year 5	5	Expansion of overburden/interburden storage areas	185
Year 6	20	Begin West Pit	205
Year 7	8	Expansion of West Pit	213
Total	213	Disturbance includes all areas bonded under this NOI	213

Notes: (1) After year 7, mining and processing may continue, but no additional disturbance would occur. (2) While year-to-year disturbance given above may change as conditions warrant, in no case will total disturbance exceed the permitted 213 acres.

Deleterious materials and their management during operations are described above within the operating descriptions in Section 106.2.

106.4. Nature and Amount of Materials to be Mined

The materials to be mined are tar sands. In the Uinta Basin of Utah, the tar sands deposits are overlain by the Green River Formation containing lenticular beds of lacustrine sandstone saturated with bitumen separated by intervals of barren sandstone, siltstone, shale, mudstone and calcareous marl. The overburden materials are comprised of siltstone and sandstone with interbedded shale; interburden layers between the tar sand deposits are expected to have the same characteristics as the overburden materials. Figure 5 provides a geology map showing surface formations in the area, and Figure 6 provides a geologic cross section that focuses on the tar sands beds within the Douglas Creek member.

Areas to be mined within the overall pit layout are categorized by geology and presence of overburden/interburden, as shown in the following table. The mining areas have been characterized into layers including overburden, tar sand layers in the 'D' bed and 'C' bed, and interburden. Overburden varies from 0 to 50 foot depth and averages 20 foot depth. Interburden thickness averages 15 feet. The "D" bed averages 21 feet in thickness and the "C" bed averages 24 feet in thickness. This is a ratio of 1.25:1, ore:overburden.

Table 3 provides per-acre and total volumes of material to be mined. The overall material balance is as follows:

	1,996,082 cubic yards of overburden
+	1,510,383 cubic yards of interburden
=	3,506,465 cubic yards of overburden and interburden removed
+	4,382,476 cubic yards of tar sands mined
=	7,888,941cubic yards total volume extracted
-	10 percent (conservative, by weight of tar sands) bitumen
=	3,944,228 cubic yards of sand after processing
+	3,506,465 cubic yards of overburden and interburden
=	7,450,693 cubic yards of material to be disposed of
x	1.3 bulkage factor
=	9.7 million cubic yards of material to be disposed of
-	4.9 million cubic yards put in overburden/interburden storage areas
=	4.8 million cubic yards to be back-filled in the mine pit

Table 3: Material to be Mined from the North (Opening) Pit Exclusive of the West Pit (61.51 acres)

	Total Volume in yd^3	Overburden in yd^3	Tar Sands - D Bed in yd^3	Interburden in yd^3	Tar Sands C - Bed in yd^3
Per Acre Average	128,255	32,451	33,195	24,555	38,053
Total	7,888,941	1,996,082	2,041,807	1,510,383	2,340,669

The material volumes in Table 3 do not include the potential material mined from the West Pit. Anticipated yearly mined tonnages from the North (Opening) Pit include: 920,000 – 1,200,000 tons of oil sand ore mined per year and 1,000,000 - 1,400,000 tons of overburden/interburden mined per year. Once the mining process is underway, it will be determined whether or not to continue the mining of the North (Opening) Pit into the West Pit. The expected life of the mine is expected to be between 6 and 13 years, depending on the amount of time the processing equipment is on-stream and the number of process trains employed. (Only one process train is covered under this NOI; should additional trains be needed, they would be covered in a permit amendment.)

106.5. Existing Soil Types/Location and Extent of Topsoil

EXISTING SOIL TYPES

Soil types in the Study Area include the Seeprid-Utso complex, 4 to 25 percent slopes, on the upper flats, and Tosca gravelly sandy loam, 25 to 40 percent slopes below this, where the terrain starts to drop off into the drainages. The Gompers-Rock Outcrop complex, 50 to 80 percent slopes, lies on the steep, lower sideslopes of significant drainages and may be affected by overburden/interburden storage areas at the heads of drainages, or if mining continues significantly to the north. The Saddlehorse-Rock outcrop-Pathead association, 50-80 percent slopes, is found on south-facing slopes on the north end of the Study Area. It will not be affected in the next five-year development plan, thus it is not discussed further here.

The *Seeprid-Utso complex* is found from 8,100 to 9,200 feet elevation and occurs on the shoulders and summits of hills in the Mountain Stony Loam (browse) ecological site. It is derived from Aeolian deposits over residuum derived from sandstones and shales. Bedrock is generally 40-60 inches from the surface. The top 4 to 18 inches are loam to clay loam. Below 18 inches the soil becomes very channery. The soil is well drained and pH ranges from 6.6 to 7.8 in the top 18 inches. There is some calcium carbonate accumulation below 24 inches. Sodium levels and SAR are very low. The soil supports shrubs with a grass understory.

The *Tosca gravelly sandy loam*, 25 to 40 percent slopes occurs from 7,500 to 8,200 feet elevation on the backslopes of plateaus in the Mountain Stony Loam (browse) ecological site. It is derived from slope alluvium derived from sandstone and shale. Bedrock is generally 40-60 inches deep. Topsoil includes up to 2 inches of organic material underlain by a gravelly sandy loam to 11 inches. Below this the soil is very gravelly to cobbly. The pH ranges from 5.1 to 8.4 in the top 11 inches and from 7.9 to 9.0 below this. Calcium carbonate increases with depth, with the highest percentage between 11 and 39 inches. This soil has very little sodium.

The *Gompers-Rock outcrop complex*, 50 to 80 percent slopes is found from 6,500 to 7,400 feet elevation on cliffs, erosional remnants, escarpments and ledges in the Upland Very Steep Shallow Loam. It is derived from colluvium over shale residuum. Bedrock is within 4-8 inches of the surface. The top 8 inches is a very channery silt loam to loam. It is well-drained; the pH is 7.9 to 9.0. It has a calcium carbonate percent up to 30, and an SAR up to 10.

Table 4: Soil Types

Soil Series	Ecological site	Topsoil depth (inches)	pH	CaCO3 %	Gypsum %	SAR	Precipitation (inches)
Seeprid-Utso complex, 4- to 25% slopes	Mountain Stony Loam (browse)	4-18 *(avg. salvage depth 6 inches, assumed)*	6.6 to 7.8	To 75%	0	0	16-22
Tosca gravelly-sandy loam, 25-40% slopes		0-11 *(avg. salvage depth 4 inches, assumed, slope permitting)*	5.1 to 8.4	To 40%	0	5.0	16-22
Gompers-Rock outcrop complex, 50-80% slopes	Upland Very Steep Shallow Loam	0	7.9-9	To 30	0	5-10	12-16

LOCATION AND EXTENT OF TOPSOIL

Topsoil occurs to some extent on all of the mining area and is suitable for plant growth and reclamation. However, based upon site development to date under the small mine permit, the actual salvageable topsoil depths found on site are less than those reported above. Of the 213 acres that will be affected under this NOI, approximately 18 acres will be used for topsoil storage and topsoil will not be salvaged from this area. On the remaining 195 acres of disturbance, topsoil will be salvaged prior to mining from all areas where it is practical to salvage topsoil (slopes flatter than or equal to than 2H:1V), and it will be stored for reclamation. For the purposes of the topsoil volume summary discussed below, it is assumed that topsoil will be salvaged from 175 acres (142 acres of Seeprid-Utso complex soils and 33 acres of Tosca soils from slopes flatter than 2H:1V). The remaining Tosca soils (20 acres) that occur on slopes steeper than 2H:1V will not be salvaged.

Based upon previous site development, topsoil depth varies from approximately 2 to 4 inches on the ridgetops and 0 to 3 inches on sideslopes. About two-thirds of the Affected Area would occur in the deeper, ridgetop, Seeprid-Utso complex soils. With an average topsoil salvage depth of 6 inches on 142 acres of this soil type, an estimated 114,550 cubic yards of topsoil will be salvaged and stored for future reclamation. For the remaining disturbances where Tosca soils occur on slopes flatter than 2H:1V (33 acres), an average salvage depth of 4 inches is assumed feasible. An estimated 17,700 cubic yards of topsoil will be salvaged and stored for reclamation from these areas. Therefore, the total topsoil salvage for this operation is estimated to be 132,250 cubic yards.

However, it is important to note that this is an estimate only; actual soil salvage volume could be more or less than this amount. The actual amount salvaged would be dependant upon what is encountered in the field: all available topsoil would be salvaged (with the exceptions noted above for the topsoil storage piles), which in some areas may reflect a lesser thickness than assumed and in other areas may be a greater thickness than assumed. The amount calculated above is the amount upon which reclamation is based and for which bonding will be in place.

106.6. Plan for Protecting and Re-depositing Existing Soils

Salvaged topsoils will be collected with a 631 scraper and a D8 dozer used in combination depending upon the gradient and the presence of rock. It will be stored in topsoil storage areas shown on Figure 3. These storage areas are located on flat to gently sloping ground along the margins of the mining and processing areas. This will minimize haul distance, facilitate isolation and protection of the soil resource, and reduce contact with storm water run-on from outside the storage footprint. Topsoils will be protected by seeding with a fast growing cover grass, such as slender wheatgrass and/or Sandberg bluegrass seeded at a total of 10 PLS (pure live seed) pounds per acre. Topsoil piles will be bermed at the outer edges for runoff control, using the salvaged and compacted woody vegetation that is removed prior to topsoil salvage activities. These berms will be trapezoidal in cross section: two feet high, with a two-foot wide top width and approximately 1.5H:1V sideslopes. A sign will be placed at each topsoil storage area, which will read "Topsoil Storage Area – Do Not Disturb". The estimated 93,170 cubic yards of salvaged vegetation will be placed adjacent to or on top of the salvaged soil.

Topsoil will be deposited on areas prepared for reclamation once mining and/or backfilling is complete in an area and the surface is at final grade. It is hoped that 6 inches of soil can be salvaged from the 142 acres of Seeprid-Utso complex soils, and that about 4 inches of soil can be salvaged from approximately 33 acres of the shallower Tosca soils. Soils on the steeper slopes (those greater than 2H:1V) of the Tosca soils covering approximately 20 acres of the total 55 acres of Tosca soils that will be disturbed will not be salvaged. An estimated 132,250 cubic yards of soil will be available for reclamation by the end of development of this mining area. This averages out to a re-spread depth of about 5 inches of topsoil over 195 acres of disturbance (This does not include the 18 acres of disturbance associated with topsoil stockpiles where salvage would not occur and thus would not need topsoiling).

106.7. Existing Vegetative Communities

The Study Area elevations range from 8,222 feet on the ridgetop to 7,560 feet in the drainages. Existing vegetation in the Study Area includes mixed shrub and sagebrush/grassland communities on the ridgetops, with junipers on slopes upper slopes, trending to a Doug fir community as elevation decreases. There are some aspen patches in the drainages. The Affected Area is primarily within the mixed shrub and sagebrush/grassland communities.

Vegetation Cover Levels Sufficient to Establish Re-vegetation Success Standards

On August, 16, 2007 a quantitative vegetation survey utilizing 13 one-meter-square quadrats was conducted on plateaus and slopes located between 7,720 feet and 8,880 feet elevation within the Study area, including within and immediately adjacent to the Affected Area. (See Figure 8 for quadrat locations, and Appendix C for vegetation survey data). On May 16, 2007 a qualitative vegetation survey listing all species noted was conducted on plateaus, slopes, and upper canyon sites located between 7,440 feet and 8,840 feet elevation on hilltops and hillsides within the mine area. Results of the vegetation surveys are summarized in Tables 5 and 6 below.

Table 5: Results of 13 cover transects surveyed August 17, 2007 to determine revegetation success standards.

Shrubs & Trees	*50.3*
Grasses	*14.7*
Forbs	*2.7*
Total vegetation cover	*67.7*
70% of cover value	***47.4***
Litter	*12.7*
Rock	*16.7*
Bare Ground	*21.0*
TOTAL	***100.0***

These results indicate that the post-reclamation vegetative cover for upland areas must be at least 47 percent to meet bond release standards.

Table 6: Species List of all species noted on May and August field trips to EERI Study Area

Scientific name	Common name	Relative abundance
Shrubs, Trees, and Sub Trees		
Quercus gambelii	Scrub oak	Common at mid-hi elev
Cercocarpus montanus	Birchleaf mountain mahogany	Common at mid-hi elev
Purshia tridentata	bitterbrush	Common at mid-hi elev
Amelanchier alnifolia	Utah serviceberry	Abundant at mid-hi elev
Symphoriocarpus albus	Snowberry	Abundant at mid-hi elev
Artemisia tridentata	Big sagebrush	Abundant at mid-hi elev
Artemisia filifolia	Fringed sage	Occasional at mid-hi elev
Artemisia ludoviciana	Herbaceous sage	Occasional at mid-hi elev
Chrysothamnus nauseosus	Rubber rabbitbrush	Occasional at mi-hi elev
Juniperus osteosperma	Utah juniper	Common at mid elev
Pinus edulis	Pinyon pine	Occasional at mid elev
Pseudotsuga menziesii	Douglas fir	Common at lower elev.
Populus tremuloides	Aspen	Common in drainages
Berberis repens	Oregon grape	Occasional at lower elev
Rosa woodsii	Woods rose	Occasional at lower elev
Ribes sp.	Currant	Occasional at lower elev
Pachistima myrsinites	Mountain boxwood	Occasional at lower elev
Forbs		
Opuntia sp.	Prickly pear	Occasional at mid-hi elev
Collinsia parviflora	Blue-eyed Mary	Occasional at mid-hi elev
Taraxicum officionale	Dandelion	Occasional at mid-hi elev
Astragalus beckwithii	Beckwith astragalus	Occasional at mid-hi elev
Phlox longifolia	Long-leafed phlox	Occasional at mid-hi elev
Erigeron pumulis	Shaggy daisy	Occasional at mid-hi elev
Senecio sp.	Senecio	Occasional at mid-hi elev
Delphinium bicolor	Larkspur	Occasional at mid-hi elev
Aquilegia sp.	Columbine	Occasional at lower elev
Frasera speciosa	Monument plant	Occasional at mid-hi elev
Lithospermum incisum	Puccoon or Fringed gromwell	Occasional at mid-hi elev
Stanleya pinnata	Wallflower	Occasional at mid-hi elev
Cryptantha glomerata	Popcorn flower	Occasional at mid-hi elev
Phacelia linearis	Narrow-leafed phacelia	Occasional at mid-hi elev
Antennaria sp.	Pussy toes	Occasional at mid-hi elev
Saxifraga sp	Brook saxifrage	Occasional at mid-elev
Osmorhiza beteroi	Mountain sweet cicely	Occasional at mid-elev
Erodium cicutarium	Red stem filaree	Common under aspen
Achillea millefolium	Yarrow	Occasional under aspen
Maianthemum stellatum	False Solomon's seal	Occasional under aspen
Urtica dioica	Stinging nettle	Occasional under aspen
Descurainia pinnata	Flixweed	Common under aspen
Circium arvense	Canada thistle	Occasional under aspen
Grasses & Grass-likes		
Poa sandbergii	Sandberg bluegrass	Common at mid-hi elev
Pseudoroegneria spicata	Bluebunch wheatgrass	Common at mid-hi elev
Achnatherum hymenoides	Indian ricegrass	Occasional at mid-hi elev

Scientific name	Common name	Relative abundance
Pascopyron smithii	Western wheatgrass	Common at mid-hi elev
Carex sp.	Dry-land or mountain sedge	Common under firs
Calamagrostis purpurascens	Purple Reedgrass	Occasional under firs
Bouteloua gracilis	Grama grass	Occasional at mid-elev
Poa pratensis	Kentucky bluegrass	Common under aspen
Leymus cinereus	Ryegrass	Occasional under aspen
Carex aquatilis	Water sedge	Seasonally
Scirpus sp.	Rush	Seasonally

106.8. Depth to Groundwater

The depth to the regional groundwater table in the vicinity of the Study Area is expected to be 1,500 feet or more (Price and Miller 1975). Nearby springs or seeps (shown on Figure 7) provide evidence of very localized, shallow groundwater, likely representing isolated perched aquifers. Previous geologic exploration drilling at the site, at maximum depths of approximately 150 feet below ground surface, did not encounter groundwater. This drilling consisted of 25 wells drilled under the previously mentioned DOGM exploration permits. Six of these wells were drilled under E/019/052, along Seep Ridge Road south of the County line within Earth Energy's lease area, but just east of main Affected Area. The remaining wells were drilled under E/019/053, also located along Seep Ridge Road, spanning the County line, and within the eastern part of the 213-acre Affected Area. Maps from DOGM exploration permits that show these locations are included in Appendix B. Depth to groundwater is also discussed in Appendix B, within correspondence requesting Permit-by-Rule coverage under the Utah Division of Water Quality's (DWQ) groundwater protection program.

Extent of Overburden Material

The tar sand beds crop out in PR Canyon to the northeast of the mine area, and in Main Canyon to the southwest of the mine area (Murphy, Leonard A., 2003 private report).

Twenty-five holes drilled by Earth Energy in 2005 penetrated to the highest, or "D" bed, of the tar sands. Average depth to mineable ore was 20 feet, with areas near the outcrop having virtually no overburden, and areas on the southwest side having up to 50 feet of overburden.

Between the two beds that will be mined (the higher D bed and lower C bed) there is a layer of interburden that averages 15 feet in thickness (total average thickness of waste rock = 35 feet) (Figure 6). The "D" bed averages 21 feet thickness and the "C" bed averages 24 feet in thickness (total average thickness of ore = 45 feet). This is a ratio of 1.25:1 (ore:waste rock). As noted in Table 3 above (see Section 106.4), it is estimated that there will be 1,996,082 cubic yards of overburden and 1,510,383 cubic yards of interburden salvaged to mine the 62-acre North (Opening) Pit.

Geology

Rocks on Earth Energy lands include thick, buff-to-cream, rim-forming, cross bedded sandstone cropping out in the bottom of Main Canyon. These rocks were mapped by Gaultieri (1988) as the Renegade Member of the Wasatch Formation consisting of medium to thick, indistinctly banded sandstone with sparse shale. These beds are overlain by the Green River Formation containing lenticular beds of lacustrine sandstone saturated with bitumen separated by intervals of barren sandstone, siltstone, shale, mudstone and calcareous marl. Five distinct asphalt impregnated sands, labeled "A", "B", "C", "D" and "E" with "E" the highest strata, occur in the upper portion of the Douglas Creek Member of the Green River Formation (Byrd, William D. 1970) and (Clem, K. 1984). The "E" bed is regionally known, but is not present locally. The beds crop out in PR Canyon to the northeast and Main Canyon to the southwest of County Road 2810 (Seep Ridge Road). All four beds occur in an interval 240 to 290 feet thick (Murphy, Leonard A., 2003 private report). Figure 5 provides a geology map and Figure 6 provides a geologic cross section that focuses on the tar sands beds within the Douglas Creek member. In the area of the opening pit, the strike of the beds is N 20° E, and the dip is 1.2-1.7° NW. The axis of the San Arroyo Anticline trends N 60 W veering to a S 45 W trend 1-2 miles east of the Affected Area (Figure 5). The strike and dip of the ore beds vary slightly throughout the planned mine area as the host formations are part of a gentle anticlinal structure, but dip probably averages about 1.5°.

Twenty-five holes drilled by Earth Energy in 2005 penetrated only the highest or "D" bed. Moderate-to-well saturated tar sand was cut at depths ranging from 10 feet to 40 feet with an average depth of 19 feet, ranging in thickness from 10 feet to 30 feet. Information from these holes and work by authors previously mentioned confirm mineable tar sands may be expected in the area.

106.9. Ore and Waste Stockpiles

The mined tar sands will be stockpiled adjacent to the processing facilities in areas shown on Figure 3. Generally, the operator will maintain a two-week supply of ore at the processing facility. It is expected that no more than approximately 40,000 cubic yards of tar sands will be stockpiled at any one time, awaiting processing. This material would be piled within loader range of the inlet feed hopper (about 200 to 500 feet). It would have a maximum footprint of about 100 yards by 100 yards, and a maximum height of four yards, and may be placed within one or more piles in this area whose combined footprint does not exceed that noted above. In addition, up to 2,500 cubic yards of reject material (rejected material barren of bitumen (rocks) and/or loads of ore that have been hauled to the plant site, but which contain too high a percentage of barren material (stringers) to be viable for processing) would be piled at any one time in a location near the ore stockpiles, prior to being returned to the pit as backfill or disposed of in the overburden/interburden storage areas.

Waste sand from the processing operation would contain 10 to 20 percent water and will be fairly neutral chemically. Recent process equipment evaluations indicate the moisture content of the blended sand/clay fine tailings will be in the order of 15%. As noted above, this level of moisture content is near optimal for compaction and will not lead to liquefaction or cause pore water pressures that would be a concern. Earth Energy has received Permit by Rule coverage under DWQ's Groundwater Protection Program, due to the *de minimus* impact of the project, including the planned pit backfills with processed tar sands, on groundwater resources. Copies of related correspondence are included in Appendix B.

Initially, produced sand will be discharged in the upper reaches of the overburden/interburden storage areas until there is sufficient room available in the opened mine pit to permit commencement of backfill to the pit. Once mining has opened a large enough excavation to allow equipment movement and backfilling, produced sands would be re-deposited in the pit.

Runoff from the overburden/interburden storage areas will be controlled in armored (rip-rapped) areas at the margins and energy dissipation at the toes of their slopes. Typical design drawings for these BMPs are shown in Figure2b. These structures, as with all site BMPs, will be maintained to ensure that they are functional.

TAILINGS FACILITIES

There would be no liquid tailings ponds associated with this mining operation.

WATER STORAGE/TREATMENT PONDS

Water for processing would come from a deep water well (1,000 to 2,600 feet deep) drilled approximately 1 mile east of the production facility. A water right transfer with the Uintah Water Conservancy District allows Earth Energy to use up to 360 acre-feet per year of Green River basin water (currently allocated under Water Right No. 41-3523). Approval must be granted from the State Engineer to approve the well location. Well water would be pumped and piped via deep-buried and/or insulated 6-inch-diameter, HDPE pipeline, and stored in the retention pond described below. As noted above, gauges will be installed in the pipeline during construction so that any leaks can be detected. This well and pipeline is permitted separately under Exploration Notice #E0190053). In addition, recycled process water will be stored in an insulated storage tank with an approximate capacity of 4,000 barrels.

There would be no treatment ponds located on the site. However, a retention/storage pond will be located at the low point of the plant site, and will collect all plant site runoff and runoff-transported sediments; it will also be used to store clean reserve make-up water (approximately 10,000 barrels, which equates to a 2.5-day supply. This pond will be lined in order to preserve the availability of make-up water. Lining is not needed to prevent water quality impacts. Any sediments that collect in this pond will be removed as needed to maintain design capacity. All precipitation collected within the working mine pits and process areas will be used in the process or for dust suppression on mine and plant roads.

106.10. Amount of Material to be Extracted, Moved

As illustrated in Table 3 (Section 106.4), over the next five years approximately 4,382,475 cubic yards of tar sand ore will be removed from the mine for processing into bitumen. To accomplish this, approximately 132,250 cubic yards of topsoil will be removed from lands to be disturbed and set aside for reclamation purposes. Approximately 3,506,465 cubic yards of overburden and interburden will be removed during the course of mining, to access the ore. Ore will be mined at a rate of approximately 3,000-3,500 tons of per day, producing approximately 2,000 bbl/day of bitumen from the initial process train.

The total volume of tar sand ore plus overburden and interburden to be extracted from the North (Opening) Pit is therefore approximately 7,900,000 cubic yards (4,382,476 plus 3,506,465). Approximately 4.8 million cubic yards of overburden, interburden, and tailings (sand and fines) will be replaced in this pit. A bulkage factor of 30 percent has been applied to the replaced material (although the replaced sand tailings are expected to have a bulkage factor of <1.1).

R647-4-108. Hole Plugging Requirements

All exploration holes drilled by Earth Energy have been plugged according to the requirements of R647-4-108. Future drill holes, should there be any, would be plugged according to the same requirements. Drill holes would not be left unplugged for more than 30 days unless approved by UDOGM.

Closure of the water well is handled under Exploration Notice #E0190053 and is not part of this NOI.

R647-4-109. Impact Assessment

109.1 Surface and Ground Water Systems

SURFACE WATER

The Study Area is located on the Tavaputs Plateau along the southeastern rim of the Uinta Basin. Hydrologically, it is within the Green River watershed (in HUC 14060005), which is part of the Colorado River system. The 2,255-acre Study Area includes the relatively flat interfluve between PR Canyon and Main Canyon, as well as the headwaters of those canyons and adjacent tributaries. Figure 7 shows watershed boundaries in the Study Area, as well as other water features such as streams and springs or seeps.

The disturbances will be located on this drainage divide and extend southwestward into the Main Canyon watershed. Previous activities associated with an approved Small Mine Operation at this site have modified local natural surface drainage patterns over about five acres. Among those existing disturbances, is a small open pit in which collected runoff and precipitation is impounded.

Main Canyon and several of its tributaries (including Trail and Meadow Canyons) drain the majority of the Study Area. There are several small springs or seeps that issue in the headwater reaches of Main Canyon and support perennial flow for some distance along its main stem. Main Canyon flows generally west and northwest, entering Willow Creek several miles west of the Study Area. Willow Creek in turn flows into the Green River near Ouray. PR Canyon and a tributary named Jacks Canyon drain northward, conveying snowmelt and runoff from the northeast part of the Study Area. Although there is a small spring complex located in PR Canyon, flow in these channels is intermittent or ephemeral. PR Canyon is tributary to Sweet Water Canyon, Bitter Creek, and the White River, prior to the White River entering the Green River near Ouray.

Precipitation in this area is estimated at about 12 inches annually (Price and Miller 1975), which is generally not sufficient to sustain perennial flow in the smaller watersheds in this region. Instead, much of the Study Area is dissected by numerous ephemeral drainages that, although channels themselves are small, are located within larger canyons with steep slopes. Because the majority of mining and mining-related surface disturbance will be located on the relatively flat interfluve, there is negligible up-gradient watershed area that could contribute run-on. The small headwater drainages that will be filled with overburden/interburden

storage areas flow ephemerally, contain very small active-channel cross sections, and typically show no evidence of live water or riparian vegetation.

Overburden/interburden storage area No. 2, the western-most overburden/interburden storage area, will be located on the area that contains a water right (49-1567) for a spring near the east edge of its fill footprint. However, a May 16, 2007 reconnaissance trip to pin-point this water source and determine a flow rate found no evidence of active flow at the site listed by the State Engineer. A very minor seep, with flow too small to be measured, was found approximately 100 vertical feet down from, and ¼ mile west of the spring identified with the water right. It is in the arroyo on top of an aquitard, and only appears following heavy runoff that has migrated down along fractures. It appeared to be associated with a contact point between a shale layer and a more porous overlying area. This is outside of the Affected Area. No other water was found during this survey other than those seeps identified in Figure 7.

The plant site will be constructed to be a self-contained area, through the use of perimeter berms or ditches where needed. Ditches will be designed to pass the 10-year, 6-hour precipitation event. They will either be triangular in cross section with side slopes approximately 1.5H:1V; depth including freeboard will be less than 2 feet; or will have an equivalent cross section. Berms will generally be 2 feet high, with a two-foot top width and 1.5H:1V sideslopes. In some areas, the roads form the perimeter berm or ditch. All precipitation incident on the site will be collected in the water retention/storage pond located at the low point of the plant site (Figure 3) and used in the extraction process or for dust suppression on mine and plant roads. This pond will also be used to store clean reserve process water. If sediments accumulate in the pond, it will be cleaned as needed to maintain its design capacity. The lining used in this pond will prevent loss to infiltration so as to maximize Earth Energy's storage volume; this lining is not needed for any water quality protection purpose, and any inadvertent leak or tear that results in infiltration would not impact surface or groundwater quality. As noted, more detail on the use of all of these structures (berms, ditches, and the water retention/storage pond) will be provided when final engineering designs are available.

The mine pit is constructed with a highwall around the workings, which in all locations (during operations) will be higher than the highest elevation of the pit floor. In this manner, all precipitation on the mine pit will collect in precipitation collection sumps located in the bottom of the pit. These collection sumps are simply low areas within the working mine pit where precipitation falling directly within the pit perimeter will drain and collect. Collected precipitation will be transported to the processing site with mined ore or pumped separately and added to the process stream as part of the make-up water. The active mining area will be a pit at all times (concave to incident precipitation and run-on). No pit configurations are planned where storm water will be allowed to egress the active mine workings.

Runoff and sediment from the outslopes of the overburden/interburden storage areas will be controlled by facing the steepest portions of the slopes with coarse overburden material (similar in appearance to existing natural scree slopes) dedicated armoring placed within the "channel" formed by the contact between the pile and the native slope, and by installing a rip-rapped energy dissipater at the toe. Due to the size of overburden/interburden/ storage area materials (broken sandstones and shales mixed with lesser amounts of fines, with particles varying from fine to coarse rock rubble (run-of-mine) materials potentially as large as one cubic yard), these outslopes will not produce significant amounts of sediment. The minimal erosive potential of the proposed design slopes has been confirmed through monitoring of the similarly constructed overburden storage piles adjacent to the Company's 2005 production test pit. Typical design drawings are included in Figure2a. Runoff and erosion will be minimal from the overburden/interburden storage area top surfaces, because these will be maintained with a gentle grade away from the outslope.

SPCC

All BMPs will be inspected regularly and maintained in operable conditions. These types of BMPs are also described in a Storm Water Pollution Prevention Plan (SWPPP) developed to comply with a State of Utah Multi-Sector General Permit for Industrial Discharges (and/or the analogous EPA permit). That Permit also requires quarterly visual monitoring of storm water. All of these measures would reduce the likelihood of inadvertent discharges of process waters or erosion-produced sediments. This SWPPP is included with the NOI as Appendix G. This subject is discussed further in Section 109.4 below.

GROUNDWATER

The tar sands deposit that would be mined during this project is located in the Green River Formation. The Parachute Member of the Green River Formation is the uppermost bedrock formation found throughout the Study Area. This Formation includes various water bearing zones (including the Birds Nest and Douglas Creek aquifers), though they are apparently of limited extent and yield. The State Water Plan (Utah Division of Water Resources 1999) doesn't include any Green River Formation aquifers as significant enough to be target for groundwater development, and information from wells and springs indicates generally low yields (Price and Miller 1975).

Most springs in the area, including PR Spring, are reported to discharge from the Parachute Creek Member of the Green River Formation (Price and Miller 1975). The BLM (1984) notes that known springs within the combined Hill Creek and PR Spring Special Tar Sands Area (STSA) typically discharge at less than 50 gpm, with most discharging at less than 10 gpm. They range from fresh to moderately saline, with total dissolved solids (TDS) ranging from about 300 mg/L to 6,100

mg/L (BLM 1984). Generally, the springs are freshest near the southern extent of the STSA, in the vicinity of the Study Area, with TDS concentrations of less than 500 mg/L (Price and Miller 1975). In 1964, PR Spring was discharging at 5.6 gpm and had a dissolved solids concentration of 380 mg/L (Price and Miller 1975). These springs are not predicted to be impacted by Earth Energy's operation.

Underlying the Green River Formation at depth are the Wasatch Formation and the Mesa Verde Group, which are likely aquifer targets for Earth Energy's water supply well (which is permitted separately under Exploration Notice #E0190053). Price and Miller (1975) indicate that the potentiometric surface in the general area is 1,500 feet or greater below ground surface, with a gradient to the north. Generally, these bedrock sources are thought to be of low permeability and relatively poor water quality (Price and Miller 1975) and thus insufficient for major groundwater development. At its maximum depth of 140 feet, the North (Opening) Pit would not be expected to encounter this regional groundwater table, nor would it be expected to approach it or affect its gradient or quality.

Based upon review of drill logs obtained for a nearby abandoned (watered out) exploratory gas well, a local aquifer is anticipated to yield a sufficient quantity of groundwater for project requirements. The abandoned well of interest is located approximately 1 mile east of the plant site (on BLM land) with the target aquifer at least 1,000 feet below ground (Earth Energy personal communication). An application to the BLM for drilling of a test well at the subject location has been approved. Pending results of this test well, additional permitting through DOGM, the State Engineer's Office, and BLM may be required. Use of this deep groundwater would not affect the nearby springs.

As noted above, Earth Energy has received Permit by Rule coverage under DWQ's Groundwater Protection Program, due to the *de minimus* impact of the project, including the planned pit backfills with processed tar sands, on groundwater resources. Copies of related correspondence are included in Appendix B.

Water Rights

According to online records of the State Engineer's Office, (Utah Division of Water Rights) there are a number of water rights in and near the Study Area, as shown in Table 7 and on Figure 7. The only one of these that would potentially be affected by Earth Energy's operations would be 49-1567. This right is in the application phase, and has not yet been granted by the State Engineer's Office. It was first filed on in 1995, by Alameda Corporation and their attorney Pruitt-Gushee. The applicant stated that the use of the water would be in conjunction with several other area sources for domestic and livestock uses; these other sources were filed on at the same time as the 49-1567 water right. The quantity of water filed on at this spring was approximately 4.5 gpm. (As noted above, a field visit did not find

any evidence to indicate that a spring of this size exists at this location; it may represent a mis-plotted water right).

The water right application (and others similarly filed by Alameda) was protested by SITLA and Utah Division of Wildlife Resources (DWR), among others, in 1995. A hearing was held in 2004, at which time Alameda was apparently asked to provide additional information. The rights were neither granted nor rejected.

In early 2007, the State Engineer's Office requested that Alameda Corporation supply information on these applications and their intentions regarding them within 90 days. If this was not done, the state indicated that it would reject the applications. In early April of this year, Alameda's current attorney (Mabey and Wright) notified the State Engineer that they were pursuing some of water rights, including 49-1567, and dropping others. They further indicated that they have obtained SITLA's permission to develop the water sources on state land, including 49-1567. They have requested that the State Engineer grant these water rights ASAP.

As explained in the Surface Water section above, the May 16, 2007 reconnaissance trip to GPS the location of this spring or seep and determine a flow rate found no evidence of active flow or hydrophytic vegetation at the site listed by the State Engineer.

Table 7: Water Rights

Water Right No.	Water Source	Quantity (cfs)	Use	Water Right Owner
49-55	Unnamed Spring	0.002	Stock watering	John S. Purdy
49-57	PR Springs	0.002	Stock watering	John S. Purdy
49-193	Unnamed Spring	0.025	Stock watering	Alameda Corp.
49-196	PR Springs	0.021	Stock watering	Alameda Corp.
49-262	PR Springs	0.011	Domestic & stock watering	BLM
49-378	East Fork Jacks Canyon Spring	0.015	Stock watering & wildlife	BLM
49-495	Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-496	South PWR Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-497	North PWR Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-504	Jacks Canyon Spring	0.015	Stock watering & wildlife	BLM
49-1508	Unnamed Spring	0.05	Stock watering	SITLA

Water Right No.	Water Source	Quantity (cfs)	Use	Water Right Owner
49-1566*	Unnamed Spring	0.027	Domestic & stock watering	Alameda Corp.
49-1567*	Unnamed Spring	0.01	Domestic & stock watering	Alameda Corp.
49-1572*	Unnamed Spring	0.004	Domestic & stock watering	Alameda Corp.
49-1581*	Unnamed Spring	0.004	Domestic & stock watering	Alameda Corp.

* Application phase – water right not yet approved

An additional water right of importance is that which will be used by Earth Energy to provide water for processing the ore. Through an agreement with the Uintah Water Conservancy District, Earth Energy's long-term plan is to use Green River Water (currently allocated under Water Right No. 41-3523) via a water rights transfer of about 360 acre-feet/year. Initially, approximately 200 acre-feet/year of groundwater will be pumped from a deep water well (1,000 to 2,600 feet deep) drilled within 1-2 miles of the production facility. This deep well is being permitted by the Utah State Engineer's Office, the BLM, and DOGM (under Exploration Notice #E0190053).

109.2 Wildlife Habitat and Endangered Species

As noted in Section 106.7, the Study Area is on the top of a flat-lying plateau above Main Canyon and PR Spring Canyon. Ephemeral drainages drop steeply off the plateau into these canyons. Existing vegetation in the Study Area includes mixed shrub and sagebrush/grassland communities on the ridgetops, with juniper on upper slopes and sideslopes, trending to a Doug fir community as elevation decreases. There are some aspen patches in the drainages.

The Utah Natural Heritage Program (NHP) of the Division of DWR was contacted directly for information about known occurrences of any species of concern. Their response letter, attached in the correspondence section (Appendix B), listed occurrences of Mexican Spotted Owls (*Strix occidentalis lucida*) and greater sage grouse (*Centrocercus urophasianus*) in the vicinity of Study Area. The Mexican spotted owl was listed as a threatened species on 15 April 1993 (USFWS 2007). Sage grouse are not protected by Federal law, but as a "wildlife species of concern", it is expected that conservation actions may be needed to preclude the need to list sage grouse under the Endangered Species Act. Sage grouse are also currently listed as a sensitive species by the Utah DWR.

GIS Shape files of Mexican Spotted Owl nesting habitat, acquired from the Bureau of Land Management (BLM) Vernal Field Office indicate that there is no known such nesting habitat within 1.5 miles of the Study Area boundary, or within 3 miles of the Affected Area. It is possible, however, that owls may move up the canyons

from known nesting habitat to forage in areas closer to the mine. There is concurrent gas well development in the area, which may have already acclimated the birds to industrial activities. Conversely, this existing and previous activity may have caused them to avoid the area already. If the former, once the mine is in operation, forage within the area affected by the mining operation would not be available for Mexican Spotted Owl to forage in. This loss would be temporary, as forage habitat would be reestablished after reclamation occurs.

Locations of greater sage grouse leks, on file with the UDWR, were reviewed on June 8, 2007 by Brian Maxfield, UDWR Sensitive Species Biologist. One lek, known as the Monument Lek, is located within the Study Area and approximately 3,000 feet due north of the initial mine development, but within 100 feet of the active Seep Ridge Road and a buried gas transmission line.. Mr. Maxfield stated that sage grouse use the general area for nesting and brood rearing, while their winter range is located further to the west. The Seep Ridge Road is currently used as a thoroughfare for oil and gas development. During one visit in Summer, 2007 trucks passed the mine area approximately every 20 minutes.

While the mine has no control over vehicles associated with gas development, during mining, impacts to grouse strutting on the Monument Lek can be mitigated. Prior to Spring 2009, Earth Energy will consult with DWR to determine the status of this lek (it has apparently not been used for the last few or several years). If it was active in 2008, during Spring 2009, Earth Energy will commit to observe the Monument Lek three times during early morning hours between March 15 and April 15 to see if it is again active. During that time interval, they will cease mining between ½ hour before to 1 hour after sunrise, and 1 hour before to 1 hour after sunset. If no grouse are using the lek after three observations, mining can continue during those hours. If grouse are found to be using the lek, the twice-a-day mining cessation will continue until May 15th. This will be repeated on an annual basis, as long as the lek remains active.

Upon reclamation, any loss of potential brood-rearing habitat will be reestablished as pits will be backfilled and graded to a broad slope. The disturbed area will be reclaimed to a grass-shrubland. The reclamation seed mix includes several species palatable to sage grouse, and provides a broad mix of grasses and forbs, as well as four shrub species: sagebrush, bitterbrush, serviceberry, and snowberry.

The Utah Division of Wildlife Resources, Utah Conservation Database (UCD) at http://dwrcdc.nr.utah.gov/ucdc/ was also reviewed. It contains links to several maps showing that the Study Area is within summer habitat for elk and mule deer. Other ungulate habitat is not found near the area. In order to discourage elk and mule deer from entering the mining area, a fence would be constructed along the County Road. As recommended by the Utah DWR (personal communication with Brian Williams, DWR Northeast Region), this fence will be between 38 and 48

inches high, comprised of three or four strands barbed wire, topped with a log rail. It will be anchored with T-posts.

The UCD website also includes a list of plant and animal species that are Federally listed as Threatened, Endangered, or are Candidates for T&E designation in Utah, or are listed as Sensitive Species by the DWR. Those that are listed as present in the southern portions of Uintah and/or the northern portions of Grand Counties are listed below in Table 7 (with the exception of listed fish species, since there is not adequate live water to support fish on or near the Study Area). The information was taken from the UCD website on May 11, 2007.

Table 7: Threatened, Endangered, and Candidate Species that may be present at Earth Energy Resources Tar Sands Mine

Common Name	Scientific Name	Status	Elevation in Feet / Habitat	Chance of Presence at Project Site
Shrubby Reed-mustard	*Glaucocarpum suffrutescens*	E	6000-7000	None due to elevation
Clay Reed-mustard	*Schoenocrambe argillacea*	T	4725-5750	None due to elevation
Uinta Basin Hookless Cactus	*Sclerocactus glaucus*	T	4500-6500	None due to elevation
White River Beardtongue	*Gila cypha*	C	5000-6680	None due to elevation
Black-footed Ferret	*Mustela nigripes*	T	Prairie dog towns	None due to lack of prairie dogs
Brown (Grizzly) Bear	*Ursus arctos*	T -Extirpated	Mountain timber	None
Southwestern Willow Flycatcher	*Empidomax traillii extimus*	E	Riparian areas with willows	None due to lack of riparian habitat

Shrubby Reed-mustard, *Glaucocarpum suffrutescens,* is a Federally listed endangered plant. This perennial, clump-forming mustard produces yellow flowers in May and June. It grows on shaley, fine textured soils of the whitish, semi-barren Green River Formation, Evacuation Creek Member. It is associated with mixed desert shrub and pinyon-juniper communities at elevations of 6000 ft to 7000 ft. The Study Area elevation is generally above, and the soils thicker and deeper than those noted above, making it highly unlikely that this species would be encountered within the Study Area.

Clay Reed-mustard, *Schoenocrambe argillacea,* is a Federally threatened plant. This mustard produces white, purple-veined flowers that bloom from mid-April to mid-May. The plant is hairless with a stout, woody base. It occurs on the Green River Formation, Evacuation Creek Member, where it prefers precipitous slopes consisting of bedrock or scree mixed with fine-textured soils in mixed desert shrub communities at elevations of 4725 ft. to 5750 ft. It is unlikely that this plant would be present within the Study Area due to elevation and site characteristics.

Uinta Basin Hookless Cactus, *Sclerocactus glaucus,* is a Federally listed threatened plant that is known to occur in central and southern Uintah counties just north of the Study Area. This cactus has a solitary, egg-shaped stem that is 3-12 inches long. Pink flowers are produced late April to late May. It is found on xeric, fine textured soils overlain by cobbles and pebbles on river benches, slopes, and rolling hills of the Green River and Mancos formations from 4500 ft. to 6500 ft. elevation. It is associated with salt desert shrub and pinyon-juniper communities. It is highly unlikely that this plant would occur on the Study Area due to the higher elevation and moister site characteristics of the mine site.

White River Beardtongue, *Penstemon scariosus,* is a candidate for Federal listing as threatened or endangered. It is found in Duchesne and Uintah counties in Utah and Rio Blanco County in Colorado. This figwort has lavender to pale blue flowers that bloom in late May to June. It is found on semi-barren areas on white (infrequently red) soils that are xeric, shallow, fine-textured, and usually mixed with fragmented shale from 5000 ft. to 6680 ft elevation. It is highly unlikely that this plant would occur on the Study Area due to the higher elevation and moister site characteristics of the mine site.

The **Black-footed ferret**, *Mustela nigripes*, is Federally listed as endangered. Thought to be extinct, the species was re-discovered near Meteetse, Wyo. in the 1980's. Since then a captive breeding program has allowed introduction of populations classified as "non-essential-experimental" by the US Fish and Wildlife Service (USFWS) in the Coyote Basin area of Uintah County in 1999, as well as at other locations in the west. There are also unconfirmed sightings of naturally occurring black-footed ferrets in eastern Utah.

Black-footed ferrets are nocturnal and rely on prairie dogs for their primary food, thus they are closely associated with prairie dog towns. Loss of prairie dogs (by plague, poisoning or habitat loss) directly threatens the survival of the ferrets. Due to the lack of prairie dog colonies in the Study Area, no black-footed ferrets would be expected to occur in this area.

The **Grizzly or brown bear,** *Ursus arctos,* was extirpated (eliminated) from Utah in the 1920s. Because of the drastic decline in brown bear numbers and distribution, the U.S. Fish and Wildlife Service has listed it as threatened in the lower 48 states. The last known sighting of a grizzly bear in the state of Utah was over 50 years ago, thus it is highly unlikely this animal would be seen on or near the Study Area and no evaluation is necessary.

The **Southwestern willow flycatcher**, *Empidonax traillii*, is Federally listed as endangered. It is a rare summer resident of southern Utah up to the northern border of Grand County. It prefers riparian habitats with willows. It eats insects, seeds, and berries. It breeds in late spring and early summer in the vertical fork of a willow or other riparian tree. The Study Area is at the northern edge of the range

for this bird; the lack of developed riparian habitat in the Study Area makes it highly unlikely that this bird would occur in the Study Area.

As noted in Section 106.7, the Study Area is on the top of a flat-lying plateau above Main Canyon and PR Spring Canyon. Ephemeral drainages drop steeply off the plateau into these canyons. Existing vegetation in the Study Area includes mixed shrub and sagebrush/grassland communities on the ridgetops, with juniper on upper sideslopes, trending to a Doug fir community as elevation decreases. There are some aspen patches in the drainages.

109.3 Existing *Soil and Plant Resources*

Soils

Existing soil types in the Study Area are described in Section 106-5 above and are shown on Appendix C. Associated disturbance related to mining and processing at PR Spring mine includes approximately 15 acres to be disturbed by the plant site and 17 acres to be disturbed by the plant perimeter road and the haul road segments that are not integral to the overburden/interburden storage areas. These disturbances will remain un-reclaimed for the life-of-mine. Approximately 62 acres will be disturbed for mining the North (Opening) Pit, 31 acres will likely be disturbed by mining in the West Pit, and 70 acres will be disturbed with two overburden/interburden storage areas. The topsoil storage areas will take up approximately 18 acres of land and will not be stripped. This is a total disturbance footprint of 213 acres.

Of this acreage, 160 acres are within the Seeprid-Utso complex of soils, located on the tops and shoulders of the plateau, while 53 acres are within the shallower Tosca soils, located on the slopes below the plateau.

Reclamation will remain as concurrent as possible as mining advances and produced sand is replaced in the excavated pit. This will allow regrading, topsoiling, and seeding of some lands including portions of the mined-out pit. Thus, the total volume of topsoil stored at any one time will never reach the full 132,250 cubic yards. All salvaged soils will be used on-site in reclamation.

Plants

The Study Area intersects four plant communities: Sagebrush-grass, Mixed tall shrub, Pinyon-juniper-Douglas fir, and Aspen glade (Figure 8). All but the Aspen glade community were sampled, as no mining will occur in the aspens. Within the Study Area there are 1,638 acres of Sagebrush-grass community, 1482 acres of Mixed tall shrub community, 1203 acres of Pinyon-juniper-Douglas fir community, and 43 acres of Aspen glade community. Within the Affected Area included in this NOI, approximately 70 percent are within the Mountain tall shrub community, 20 percent are within the Sagebrush-grass community, and 10 percent are within the Pinyon-juniper-Douglas fir community. Further information about existing plant resources is included in Section 106.7, Table 3, and in Appendix C.

109.4 Slope Stability, Erosion Control, Air Quality, Public Health & Safety

SLOPE STABILITY

Generally speaking, for many open-pit mines, slope stability is a concern at the rim and floor of pits, the ground surface on which overburden/interburden storage areas are constructed, and on the slopes of constructed overburden/interburden storage areas and topsoil stockpiles. Earth Energy has specifically considered slope stability in the design of the PR Spring Mine and has ensured -- by applying a conservative approach to design grades -- that the operation will be safe and environmentally sound. The bulk of each mining pit would be constructed within the relatively flat-lying terrain of the plateau top, minimizing slope-related risks. Overburden/interburden storage areas 1 and 2 would be constructed on the steeper side slopes between the plateau top and the base of Main Canyon. Although these overburden/interburden storage areas inherently have a higher potential risk of slope stability issues, the use of flatter-than-needed grades eliminates this risk. All slopes, both interim and final, have been designed to be stable.

Regular and routine inspections will occur throughout the mine area to ensure that operating conditions remain safe; that MSHA safety guidelines are being followed, and that the mining plan stated herein is being followed. This will include inspecting to verify that the pit wall slopes are at the correct angles and that they remain stable.

PITS

The North (Opening) Pit will be incised into the terrain, with the highest walls of the pit being the highwall on the northwest and the sidewall on the northeast. The lowest walls of the pit (low walls) would be located on the southwest and southeast sides of the pit at the head of a natural, ephemeral drainage. All pit walls would be maintained at approximately 2H:1V for stability. Use of this slope represents Earth Energy's desire to facilitate pit reclamation, and to provide conservatively designed pit wall slopes to compensate for the lack of detailed knowledge regarding the extent of localized faulting or fracture planes that could cause instabilities at steeper slopes than those used here. Numerous existing road cuts and excavations in the area (including Earth Energy's 2005 production test pit) are stable with slopes steeper than 1H:1V, providing evidence of the conservative nature of Earth Energy's design. Use of 2H:1V pit walls slope will prevent rock falls. Back-break near the top rim of the pits will be controlled or eliminated by smooth transition grading. Any required blasting along the walls of the pit will be accomplished with small controlled blasts to eliminate over-break and weakening of the remaining material on the face of the slope.

The maximum depth of the North (Opening) Pit would be approximately 140 feet. The minimum depth on the low wall side of the pit would be 20 feet. The thickness of the undisturbed bank of land between the low wall of the pit and the outer side

of the native slope would be approximately 100 feet. Exploratory drill hole data did not encounter any groundwater, thus it is highly unlikely that water-bearing strata in the Parachute Member of the Green River Formation would be significant enough to create ponding behind the low-wall.

The West Pit would expand the highwall about 1500 feet to the southwest and the pit floor to approximately 7860 ft. elevation, starting from the northwest corner of the North (Opening) Pit. No water or stability problems are anticipated with the highwalls or low-walls in this pit extension.

As noted above, regular and routine inspections will occur to verify that the pit wall slopes are at the correct angles and that they remain stable.

OVERBURDEN/INTERBURDEN STORAGE AREAS

Overburden/interburden storage areas No. 1 and No. 2 will be constructed during the mining of the North (Opening) Pit and the west extension of this pit (designated as the West Pit). Both overburden/interburden storage areas will be constructed outside of the pit limits on the side-slopes of ephemeral draws above Main Canyon. The overall slopes of the land on which the overburden/interburden storage areas will be constructed ranges from 16.5 to 40 percent (10° to 22°) (see Table 8 below). During mining, the overburden/interburden storage areas will be sloped at 1.5-1.7H:1V. Upon reclamation the slopes will be graded down to between 2.5H:1V to 3H:1V.

Table 8: Slope Angles of Native Lands and Overburden/interburden storage areas

Overburden /interburden Storage Area **Number**	**Total Height in Feet of** Overburden/interburden storage areas **from toe of** Overburden/interburden storage area **to top of** Overburden/interburden storage area* ***(During Mining / Post-Reclamation)**	**Average Native Slope Angle (H:V)**	**During Mining Average Slope Angle of Outer** Overburden/interburden storage area **Slope (H:V)**	**Post-Mine: Reclaimed Average Slope Angle of Outer** Overburden/interburden storage areas **Slope (H:V)**
1	350 / 390	2.7:1	1.5:1	2.5-3:1
2	240 / 270	6:1	1.5:1	2.5-3:1

The native slopes on which the overburden/interburden storage areas will be constructed are made up of lacustrine sandstone, siltstone, shale, mudstone and calcareous marl overlain by sandstone and shale alluvium and colluvium, with scattered small escarpments and ledges. The surface material is gravelly to cobbly toward the top of the overburden/interburden storage areas with intermittent rock outcrops along the slope, and the bedrock exposed at the base of the overburden/interburden storage areas. Overburden/interburden storage area No. 1 will be constructed on a 40 percent slope (steeper than 3H:1V) that is concave, grading to a slope angle of about 10 percent (10:1) near its base. Overburden/interburden storage area No. 2 will be constructed on a 6H:1V slope. Both overburden/interburden disposal areas will be designed and constructed to be stable within standard engineering parameters.

EROSION CONTROL

Erosion control at the site will in part be accomplished by measures inherent in the design and siting of the facilities. However, some runoff and erosion control at specific locations is expected to be necessary to prevent off-site impacts. Generally, surface water will be restricted to that generated by on-site precipitation: little or no up-gradient runoff will enter the site. What surface water runoff does occur will be controlled such that erosion is minimized.

A few of the specific means of handling runoff and controlling erosion are described below, with reference to specific typical drawings. The exact placement of most of the features will hinge upon either the final engineered plans for the development, or the specific nature of observed instances of runoff/sediment problems once the site is developed, or both. As committed to, final engineering drawings will be submitted to DOGM once they are available. In addition, should the specific means of handling runoff and controlling erosion that are described in this section be ineffective, Earth Energy would replace them with another type of BMP. These structures will be industry standard, using similar materials, installation techniques, and maintenance protocols as specified in DOGM's reclamation guide (DOGM 2008).

Only minor amounts of runoff will be generated on the outslope faces of the overburden/interburden storage areas, because up-gradient runoff will be kept away from the outslopes, outslope gradients are not excessively steep, and material makeup of outslopes will allow for infiltration. Further, runoff will be controlled by facing the steepest portions of the slopes with coarse overburden material, dedicated armoring placed within the "channel" formed by the contact between the pile and the native slope, and by installing a rip-rapped energy dissipater at the toe. Typical design drawings are included in Figure 2a. Controlling runoff will minimize sediment production, and the energy dissipaters will also serve as sediment traps, causing at least some of the sediments to drop out. Further, as these materials will primarily consist of broken sandstones and shales mixed with lesser amounts of fines, their grain sizes will vary from fine to

coarse rock rubble (run-of-mine) materials potentially as large as one cubic yard. The coarser materials will typically end up near the toe of the expanding fills as the dump sites are filled to their maximum capacity. The minimal erosive potential of the proposed design slopes has been confirmed through monitoring of the similarly constructed overburden storage piles adjacent to the Company's 2005 production test pit. The concentration of coarse materials at the toe of the fills provides a natural energy dissipater for storm runoff from the faces of the dumps. This broken rock material has a very low siltation potential and will effectively encapsulate the finer material initially placed in the upper reaches of the waste dumps. Last, the top surfaces of these overburden interburden storage areas will generate very little runoff or sediment as they will be maintained with a gentle grade away from the outslope (toward the plant site and the pit, from which there will be no runoff and/or sediment discharge). Through the dumping mechanism, both outslopes and top surfaces will generally have roughened surfaces to further reduce runoff velocities and encourage material trapping.

All topsoil piles will be bermed to catch eroded material and prevent run-on and run-off of storm water. As noted in Section 106.6, these berms will either be comprised of topsoil, or built using the salvaged and compacted woody vegetation that is removed prior to topsoil salvage activities. These berms will be trapezoidal in cross section: two feet high, with a two-foot wide top width and approximately 1.5H:1V sideslopes. Figure 2d provides a typical cross section for these types of berms.

The active mining area will be a pit at all times (concave to incident precipitation and run-on). No operational pit configurations are planned where storm water will be allowed to egress the active mine workings. Thus, no specific erosion controls are needed for the pit area.

Most of the haul roads will be integral or adjacent to the pit and overburden/interburden storages areas and will not require separate erosion control. As needed, however, certain haul roads will be ditched, and if the grade increases to above two percent, water turn-outs will be constructed to prevent erosion of the road base. A typical ditch is shown in Figure 2c and a typical rolling dip turnout is shown in Figure 2f. Additionally, these ditches may also be outfitted with small coir rolls, silt fences, or other check features if needed; a typical installation is also shown on Figure 2e.

The facilities site will be constructed to be a self-contained area through the use of perimeter berms or ditches (see Figure 2c-2f for typicals) as needed to direct runoff. All precipitation incident on the site will be collected in the water retention/storage pond located at the low point of the plant site (Figure 3) and used in the extraction process or for dust suppression on mine and plant roads. This pond will also be used to store clean reserve process water. Sediment production from the plant site will be negligible, due to gradient and surfacing; any transported

in runoff would eventually make its way to the water retention/storage pond. This pond will be cleaned of sediments as needed.

All BMPs will be regularly inspected, and maintained in operable condition. These above-noted types of BMPs are also described in a Storm Water Pollution Prevention Plan (SWPPP) developed to comply with a State of Utah Multi-Sector General Storm Water Permit for Industrial Discharges (and/or the analogous EPA permit). The Permit also requires quarterly visual monitoring of storm water discharges. These measures would reduce the likelihood of inadvertent discharges of process waters or erosion-produced sediments. This SWPPP is included with the NOI as Appendix G.

AIR QUALITY

Potential air quality issues include the following:

- Fugitive dust from stripped lands, the mine pit, overburden/interburden storage areas, and topsoil stockpiles.
- Fugitive dust from the plant site area and ore stockpiles
- Emissions from the equipment used to mine, haul and process the ore
- Fugitive dust from newly reclaimed lands

Fugitive dust will be minimal from ore piles. Overburden and interburden may or may not be moist, depending on current weather conditions. However, consistency of raw ore is massive to granular and thus does not readily become airborne.

Once the tar is removed from the ore, clean sands are left to be used as backfill. This sand material will hold approximately 10 to 20 percent moisture. Waste sands and over/interburden will be alternated in construction of the overburden/interburden storage areas and backfill of the pits, to increase stability and reduce wind-blown sand, should it become dry.

Haul roads will be sprayed regularly with water from a water truck. Water will be obtained from the well associated with Exploration Notice #E0190053 and for which Earth Energy retains a water right that allows use of water for this purpose.

Earth Energy has coordinated with EPA on air permitting to sufficiently address the above air quality issues, including those associated with equipment emissions.. (EPA has taken the lead on air permitting for this operation given its Tribal Land location.) Earth Energy intends to comply with the conditions set forth by EPA; documentation is included in Appendix B. .

PUBLIC HEALTH AND SAFETY

The following measures are in place to protect public health and safety:

- MSHA safety guidelines will be followed in all aspects of this project.
- There are no shafts or tunnels within the Affected Area and therefore none that require closing or guarding.
- All trash, scrap metal, and wood, and extraneous debris will be temporarily stored at a designated location prior to being routinely hauled offsite to a licensed facility. Further, volumes of material such as product, waste oil, etc. will be periodically removed from the site as needed so that their allocated storage is not exceeded.
- Any exploratory or other drill holes will be plugged or capped as set forth in Rule R647-4-108.
- Warning signs will be posted in locations where public access to operations is readily available, including at the points of exit/entry from the main access road (Co. Road 2810) to the open pit and processing facilities.
- All blasting materials are kept in locked, ATF-approved magazines.
- Warning signs advising the public of blasting protocols will be posted at the access road to the pit area at the appropriate locations as required by MSHA from the time a blast begins to be set until the all-clear is given. These signs will include blasting schedules.
- The opening pit highwall will be bermed and fenced along the County Road. As recommended by the Utah DWR (personal communication with Brian Williams, DWR Northeast Region), this fence will be between 38 and 48 inches high, comprised of three or four strands barbed wire, topped with a log rail. It will be anchored with T-posts. Signs will be placed along the fence line every 150 feet to warn the public of the mining activity, including the potential for blasting. These signs will include blasting schedules.
- During all Earth Energy mining work in the vicinity of the Canyon Gas natural gas pipeline, Earth Energy would operate safely and in cooperation with Canyon Gas to ensure safety of both operations and the public.
- Containers stored on-site will be labeled so that wastes are clearly identified. Salvageable materials and other wastes will be stored at the plant site within the fenced area. No hazardous materials or hazardous wastes will be generated or used during this operation, thus none will be stored.

R647-4-110. Reclamation Plan

110.1 Current Land Use and Post Mining Land Use

The current land use is mining, exploration, and wildlife habitat/open space. Due to the nature of exploration and ongoing activity in the Uinta Basin, the post mining land use is likely to include exploration (by entities other than Earth Energy who may be exploring for oil and gas), as well as wildlife habitat and open space. While recognizing that oil and gas exploration may occur in the future, no further exploration is currently planned by Earth Energy, and the stated objective of reclamation planning in this NOI is to reclaim the site in order to provide for future post mining land uses of wildlife habitat and open space. In order to ensure an environmentally safe and stable condition for the wildlife in the area that meets the objectives of the Utah Mined Land Reclamation Act 40-8-12, Earth Energy will leave safe, stable topography; establish native vegetation suitable for habitat; remove man-made structures, including tanks, ponds, etc.; and cause no degradation or harm to water sources.

CULTURAL RESOURCES

Cultural resources were reviewed and inventoried onsite. No previously documented or new cultural resources were recorded (See Appendix B).

110.2 Reclamation of Road, Highwalls, Slopes, Etc.

If economics allow, mining may continue in other portions of the Study Area. In this case, facilities, and some roads may be maintained for access, and all new disturbances and operations would be subject to new permit approvals, either through amendments to this NOI or otherwise as required by DOGM. (These amendments or revisions would address how any mine expansion would occur, including details on any limited need for re-handling of materials, alterations to the processing plant, etc.) At this time, however, the mine/reclamation plan and associated bond estimate are based upon initial North (Opening) Pit mining, the West Pit, and associated disturbance. Also, for the purposes of the reclamation plan and bond estimate, it is assumed that all facilities and roads within the 213-acre Affected Area will be reclaimed as stated herein.

The overall objective of the reclamation plan described herein is to reclaim the entire Affected Area so as to allow postmining land uses of wildlife habitat and open space to resume. This objective will be met in part by removing facilities and structures that have been brought to the site, regrading, topsoiling, and reseeding, as described in more detail below. The intent is to meet the requirements of the

Utah Rules at R647-4, as stated in Section 110.6 below, and to meet the objectives of 40-8-12 of the Utah Mined Land Reclamation Act which include provisions for a safe, stable, environmentally functioning site.

Safety will be managed at reclamation by continuing to follow safe operating conditions while using equipment and continuing to follow the appropriate MSHA guidelines and regulations. Throughout the reclamation activities, visual inspections will be made at the site, under the terms of the Storm Water Permit(s) issued by either EPA or DWQ (depending upon Tribal Land jurisdictional decisions), which must remain active until bond release has been obtained. This will focus on erosion and sediment control, further ensuring that reclamation goals can be met. Further, visual inspections will also be made by DOGM, and will include ensuring that all reclamation activity obligations under the Utah Mined Land Reclamation Act and associated rules are being met. These inspections will continue until such time as DOGM approves the reclamation work and releases the surety.

Various types of equipment will be used to accomplish the reclamation objectives, as detailed in the surety calculations (Appendix E). This equipment includes: D6 and D8 dozers, Caterpillar 14 grader, Caterpillar 631 scraper, 65-ton crane, hand power tools, 35-ton dump truck, 950 loader, semi- and low-boy trailers, 100 bbl water truck, trackhoe, backhoe, seeder, and manure spreader. The water truck will be used to provide dust suppression as needed, and water will come from the well associated with Exploration Notice #E0190053 and to which Earth Energy has a water right for such uses.

ROADS

During operations, interim reclamation, and on-going reclamation and while on-site roads are still needed to access Affected Areas during final reclamation, Earth Energy will maintain roads as needed to minimize erosion and off-site sedimentation. Such road maintenance will continue until the roads are fully reclaimed.

There are approximately 17 acres attributed to roads that are not integral to the overburden/interburden storage areas (approximately 9,260 feet in length by 80 feet wide). During final reclamation, these roads would be deep-ripped to relieve compaction, regraded to blend with site topography, topsoiled, and seeded. Except where bedrock is encountered, ripping will be 24 inches deep, with ripper shanks spaced no more than 24 inches apart. In shallow bedrock areas, ripping depth may be less than 24 inches, by necessity. Roads that are integral to the overburden/interburden storage areas will be reclaimed as part of those features.

HIGHWALLS

No highwalls would remain at the end of mining as pits would be backfilled and/or graded off to blend with the existing surrounding topography.

SLOPES

All overburden/interburden storage areas (covering approximately 70 acres) and backfilled pits will be regraded to a 2.5-3H:1V or flatter slope to achieve a stable, natural-looking landscape. While short segments may exceed this overall slope, no areas will be so steep as to be unstable, cause safety hazards, encourage erosion, or hinder successful revegetation. The overburden/interburden storage areas will be re-contoured by dump-top rounding, toe extension and surface recontouring to create an undulating, roughened surface that will blend with the surrounding terrain, provide a site amenable to revegetation, and minimize runoff and erosion. The steepest portions of slopes will be faced with coarse overburden material to minimize erosive potential. This will be done with a trackhoe, backhoe, and/or dozer prior to topsoil placement. Safety and erosion control will be of primary focus during reclamation activities. As described further in Section 110.5, available salvaged topsoil will be applied to all areas with the exception of the armoured drainage channels. The entire area will be seeded with native species to stabilize the soil, and provide for the post-mining land use.

As noted, drainage will not be an issue on these regraded areas as there is little to no run-on and infiltration capacity will be high on reclaimed slopes.

PITS

Pits (approximately 93 acres) would be backfilled to approximately 60-65% of their original volume, primarily with produced sand, inter-mixed with overburden/interburden. Since the pit floor will be backfilled as part of the cast-back mining process, it will not need to be ripped. The final cut during mining will create a 3:1 slope to blend with surroundings. This will create a near-level surface (see cross-sections), thus no additional backfilling will be required during reclamation of the mined-out pits. The rough backfilled surface will be finish-graded and contoured with a road grader to assure the land blends with surroundings.

Remaining pit walls will be graded down to blend with the backfilled materials. The resulting contours would be graded to blend with surrounding topography, topsoiled, and seeded. The pit will not be an impounding feature upon final reclamation.

DRILL HOLES

No drill holes would remain at the end of mining.

FACILITIES AND MATERIALS

Some of the facilities on the 15-acre facility site would be taken apart and hauled away for disposal. Others would be buried onsite. As described further in the surety calculations (Appendix E), the maintenance building, warehouse, power plant, process train, distillation unit, sand dewatering unit, pond liner, Atco trailer, and 22 tanks would be hauled away. The facilities for which on-site burial will occur include the following: gravel from the parking area; foundations of Sprung structures; and reserve ore, sand, fines, and reject materials. Prior to any on-site burial activities, Earth Energy will obtain a solid waste disposal permit, if one is found to be necessary.

The maintenance building and warehouse are "Sprung" aluminum structures and are easily dismantled using hand power tools and crane. The mine office is a one-piece modular "Atco" office structure mounted on I-beams. Atco, which has been in business since 1947, includes removal of the structure in the purchase price, so no reclamation cost is included for this. The Power Plant is approximately 2,500 ft^2 and 20 tons, and consists of 1 gas generator, 1 diesel back-up, and 1 boiler. The process train, including piping, hoses, etc. is skid-mounted and is approximately 480 ft. long by 75 ft. wide by 20 ft. high, with a void volume of 30% for an assembled volume of 8,000 CY of material. Cut up, the volume would be roughly 25% of this, or 2,000 CY. The sand dewatering unit weighs approximately 30 tons.

All process materials will be removed from the train, prior to its being removed from the containment area, disconnected to individual skids, and hauled away. All of the residual process material will be separated into a solid, aqueous, or hydrocarbon phase. The solid phase can be discharged on site to the mined-out pits, as it consists of the same materials that have already been placed in that area. The aqueous phase will be discharged to the water storage/retention pond where it will evaporate or be pumped to a tank or container for off-site disposal. That pond will have been used for similar liquids during operations. Any remaining hydrocarbon phase that is not sold to a refinery will be recovered with a vacuum and hauled off site. No process materials that are hazardous or represent an impact to public health and safety will be disposed on site.

The re-bar reinforced concrete foundation under the warehouse and maintenance shop (each 10,000 ft^2) will be ripped up and broken into chunks using the D8 dozer.

The water/storage pond liner (60 mil) will be removed and hauled to the Uintah County Landfill on a flatbed as part of other loads. Gravel from the equipment

parking and service area (approximately 2.6 acres in size, or 1,396 CY of gravel) will be pushed into water retention pond after removal of liner with dozer. Reserve, sand and fine tails, and reject ore stockpiles (approximately 60,000 CY, total) will be loaded into trucks and hauled back to pit where an opening will be made to place unused ore in the backfilled pit. The 15-acre facilities area will be ripped, topsoiled, and reseeded.

Trash removal will occur after all buildings and facilities are removed; it will involve collection of all refuse, litter, stray metal, pipe, wood, insulation, and other debris. The 213-acre area will be inspected to check for and collect trash.

There would be no shafts or adits, or similar structures that would require reclamation. As noted above under the Pits subheading, the operating pit that forms an impoundment will not be impounding after backfilling and reclamation. Further, as described, the water retention pond will be reclaimed and thus will not remain an impounding feature.

110.3 Surface Facilities to Remain

The processing plant, all associated support facilities, and mining equipment would be removed from the site, unless economic conditions allow for continued mining, in which case the site processing facilities would remain intact on the 15-acre processing site.

Approximately 4,000 feet of fence with a wooden top rail (as per DWR request) will be in place when reclamation commences, as well as two metal safety gates, and safety signs. The fence and signs located along the county road will be left in place until bond release, at which time they would be removed.

110.4 Treatment, Location and Disposition of Deleterious Materials

During operations, all new and spent fuel, oil, and lubricants will be stored within secondary containment as required by the SPCC Plan, as further described in the operations Section 106.2. These containers and their contents will be removed to a licensed disposal facility prior to reclamation of the process facility. If any hydrocarbon spills occur during mining these will be dealt with as outlined in the SPCC Plan, and thus will not pose a problem during reclamation. Any fuel spills that occur during the reclamation process would be similarly managed.

Any other chemicals, including the process chemical, present during operations, would be consumed during mining and processing. Any of the stored substances remaining onsite at the end of mining would be properly removed and disposed of, prior to final reclamation. Any remaining fuels would be used to fuel equipment used in reclamation work. Fuels and liquids remaining after reclamation will be

removed for disposal or re-use by a company such as Tri-State Recycling. No acid forming or deleterious material would be left on-site.

110.5 Revegetation Planting Program and Topsoil Redistribution

Table 9, below, shows that all of the 213 acres of Affected Areas will be reclaimed by various methods. This includes redistributing topsoil on all areas except those associated with the armored drainage channels and the topsoil storage areas (soils will not have been salvaged on those areas, so original topsoil will remain).

Table 9 Reclamation Treatment Acres

Facility	Affected Area (acres)	Acres to be graded	Acres to be ripped	Acres to be topsoiled	Seeded Acres
Plant Site including Office and Processing facilities	15	0	15	15	15
Plant Perimeter Road	5.5	5.5	5.5	5.5	5.5
Haul Road Segment 1	5.5	5.5	5.5	5.5	5.5
Haul Road Segment 3	3.0	3.0	3.0	3.0	3.0
Haul Road Segment 5*	3.0	3.0	3.0	3.0	3.0
North (Opening) Pit	62	62	0	62	62
West Pit	31	31		31	31
Overburden/interburden storage area 1	36	36	0	36	36
Overburden/interburden storage area 2	34	34	0	34	34
Topsoil storage areas	18	0	18	0 (topsoil already in place)	18
Total	213	180	50	195	213

*Haul Road Segments 2 and 4 are integral to overburden/interburden storage areas and reclamation treatments are included within those facilities.

SOIL MATERIAL REPLACEMENT

Once final grading is complete, as described above, topsoil will be replaced using scrapers and dozers. Topsoil would be placed on the backfilled and regraded surfaces of the pit and overburden/interburden storage areas (with exceptions as noted previously) as the mining/processing/ backfilling sequence allows. Approximately 132,250 cubic yards of topsoil will be redistributed to about a 5-inch depth with a scraper and dozer assist, over approximately 195 acres of the mine. Topsoil storage areas will not be topsoiled.

The graded/topsoiled surfaces would be ripped with a road grader on the contour to provide a greatly roughened surface to retain seed and to enable root penetration. Vegetative matter gathered during the topsoil salvage operations and stockpiled as a component of those piles would also be spread along with the topsoil, providing organic matter and helping with soil moisture retention. Any additional salvaged vegetation that was stored in slash piles will be placed and redistributed on reclaimed areas in order to provide organic matter and surface roughness.

Equipment used for this task is likely to be a dozer, scraper and farm tractor/ implements.

SEED BED PREPARATION

As described above, the topsoil will be spread and left in a very roughened surface that will be loose but not erodible. Ripper shanks on a road grader will be used to stabilize soil, depending on field conditions. The ripper will be used with shanks spaced approximately 36 inches apart and 18 inches deep. The salvaged topsoil will provide a reasonable growth medium for the site. No mulch or fertilizer will be used in reclamation efforts. The final surface will be rough, creating small depressions for water retention sites and habitat niches.

Seed Mixture

A single seed mix (below) will be used for all reclaimed surfaces and is based on sampling results and NRCS ecological site data. Any alterations beyond what is included in the list would require agency approval. All 213 acres affected will be seeded with a D6 tractor-pulled broadcast seeder.

Table 10: Seed Mix

SPECIES	SEEDS/LB	PLS* LB/AC
Forbs -		
Blue flax (*Linum lewisii*)	293,000	0.50
Rocky Mountain penstemon var. Bandera (*Penstemon strictus*)	592,000	0.25
Small burnet (*Sanguisorba minor*)	55,000	1.00
Lupine (*Lupinus caudatus* or *L. alpestris*)	27,600	1.00
Total forbs in seed mix		2.75
Grasses -		
Muttongrass (*Poa fendleriana*)	890,000	2.00
Canby bluegrass (*P. canbyi*)	926,000	1.00
Indian ricegrass (*Achnaetherum hymenoides*)	150,000	2.00
Great basin wildrye var. Magnar (*Leymus cinereus*)	130,000	2.00
Bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*)	140,000	3.00
Western wheatgrass (*Pascopyrum smithii*)	110,000	3.00
Total grass in seed mix		13.00
Shrubs -		
Sagebrush – Wyoming or Mountain (*Artemisia tridentata wyomingensis or vaseyana*)	2,500,000	0.25
Bitterbrush var. Lassen (*Purshia tridentata*)	15,000	2.00
Serviceberry (*Amelanchier alnifolia*)	25,800	1.00
Snowberry (*Symphoricarpos oreophilus* or *S. albus*)	75,000	1.00
Total in shrubs in seed mix		4.25

Total pounds of seed applied per acre: 20.0 PLS lb/ac

* PLS = Pure Live Seed

Seeding Method

The seed mix would be broadcast seeded on all areas that will be reclaimed, including regraded overburden/interburden storage area slopes and pit slopes. Revegetation work, including both seedbed preparation and seed application will take place in the late fall season and seed would be spread as soon as possible following seedbed preparation.

Other Revegetation Procedures

As noted throughout this document, all reclaimed slopes will be stabilized by regrading to 2.5H:1V or flatter and leaving them in a very roughened form to maximize infiltration and minimize runoff. It is important to note that there will be little to no run-on on these reclaimed surfaces. Further, in regard to the overburden/interburden storage area slopes, the coarser materials will typically end up near the toe of the expanding fills as the dump sites are filled to their maximum capacity. The concentration of coarse materials at the toe of the fills provides a natural energy dissipater for storm runoff from the faces of the dumps. The broken rock material has a very low siltation potential and will effectively encapsulate the finer material initially placed in the upper reaches of the overburden/interburden storage areas.

Earth Energy would monitor for noxious weeds, and would provide weed control measures according to County directives should noxious weeds pose a potential problem. This would be done in the early summer months each year after reclamation until bond release has occurred. The monitoring would consist of a site visit by a biologist familiar with the potential noxious weeds, and a simple visual walk around the 213-acre area would be sufficient for this small area. If any noxious weeds are identified, the County would be informed of their extent, and actions taken as directed by them.

Further, Earth Energy would qualitatively and visually monitor revegetation success for the first two years after reclamation, during the growing season. During the third summer, quantitative surveys, following the appropriate Division guidelines, will be conducted to assess revegetation success. This will determine whether revegetation has achieved 70 percent of the pre-mining cover, and survived after three growing seasons, as required by R647-4-111.13.11.

110.6 Statement

Earth Energy would conduct reclamation as required under the Utah Rules R647-4.

R647-4-112. Variance

No variances are being requested for this mining operation.

R647-4-113. Surety

A reclamation surety estimate is being provided to the Division and is summarized below. See Appendix E for the spreadsheet and backup information. The bond is for 213 acres and is shown as "Affected Area" acres on Figures.

1)	Clean-up and removal of structures	$ 244,744.
2)	Backfilling, grading and contouring	$ 18,740.
3)	Soil material redistribution and stabilization	$ 120,281.
4)	Revegetation (preparation, seeding, mulching)	$ 174,387.
5)	Safety gates, berms, barriers, etc.	$ 14,208.
6)	Demolition, removal or burial of facilities/structures, regrading/ripping of facilities areas	$ 127,697.
7)	Regrading, ripping of waste dump tops and slopes (overburden/interburden storage areas)	$ 362,549.
8)	Regrading/ripping of topsoil stockpile areas	$ 1,788.
9)	Ripping access roads	$ 4,834.
10)	Drainage reconstruction	$ 0.
11)	Mulching, fertilizing and seeding the Affected Area	$ 0.
12)	General site clean-up and removal of trash and debris	$ 18,791.
13)	Removal/disposal of hazardous materials	$ 275.
14)	Equipment mobilization	$ 9,721.
15)	SUBTOTAL 1 Base cost for reclamation	$ 1,098,014.
	15.1 Supervision during reclamation	$ 109,801.
	15.2 Revegetation monitoring & weed control	$ 119,361.
16)	SUBTOTAL 2 Reclamation, Supervision, & Monitoring	$1,327,176.
	16.1 Contingency (5%)	$ 66,359.
17)	SUBTOTAL 3:	$1,393,535.
	17.1 Escalation (for 5 years at 3.8% per yr.)	$ 285,675.
18)	TOTAL: Reclamation liability estimation	$1,679,210.
	ROUNDED TOTAL:	$1,679,200.

References

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Earth Energy Resources Bond Summary Worksheet

Please see attached sheets ("Equipment", "Rates", and "Building Calcs") for backup information

CRG = Cost Reference Guide, 2008

Means 2008 = 629 RS Means Heavy Construction Cost Data, 2008

1 Clean up and Removal of Structures (Removing crushers, conveyors, etc.)

This entails removing the equipment listed below by dismantling, loading on dump trucks and flat-bed trailers with a crane and four laborers, and hauling to the Uintah County Landfill for disposal. Costs for the crane, laborers, hauling by truck, dump fees, and use of a water truck to suppress dust during demo activities are included below each category.

Dump fees are $30/load for a 10-12 yard dump truck, $50/ton for a 30-50 yard dump truck, $15/ton for loads on flatbeds, $20/ton for petroleum contaminated soils. No liquid wastes are accepted, according to Greg Jensen, Uintah County Landfill, April 2008.

The Landfill is 88 miles from the mine site.

Items to be Removed

Tanks	22 tanks (7 400 bbl, 15 1,000 bbl, total volume 98,960 cu. ft., will be cut into pieces, lifted onto a trailer, and hauled to the Uintah County Landfill.
Maintenance Shop and Warehouse	These are "Sprung" aluminum structures. Easily dismantled using hand power tools and crane. Removal of both 10,000 ft2 buildings will require 5 days and will fill 4 trailer loads. Weight is 35,525 pounds each. (personal communication, April 1, 2008, Jared Heaton of Sprung Instant Structures, website at: http://www.sprung.com/en/index.php.) The mine office is a portable structure and will be removed from the site.
Mine Office	The mine office will be removed by ATCO and all costs will be born by them. They will do any and all prep work related to this task and bear those costs as well. Prep work will generally just entail disconnecting hoses. The building will not be gutted as it may be used elsewhere by others off site. No costs are included here for the office building because non will be incurred by Earth Energy.
Power plant	Size is approximately 2,500 ft^2, weighs 20 tons, and consists of 1 gas generator, 1 diesel back-up, 1 boiler. Removal using a crane, loader, and laborers will take one day and 2 trailers.
Process train	One process train. Each includes piping, hoses, etc. and is skid-mounted. Each is approximately 480 ft. long by 75 ft. wide by 20 ft. high. The train would be drained of all process materials, disconnected to individual skids and hauled away. Once cut up, the volume would be roughly 2,000 CY.
Distillation unit	The distillation unit weighs approximately 20 tons and will require a crane to load on a trailer. It will fill 90% of one trailer load to remove.
Sand dewater unit	The sand dewater unit weighs approximately 20 tons and will require a crane to load on a trailer. It will fill 90% of one trailer load to remove.
Sand remaining in process unit	Assume a 2 day retention time in the process unit. Total sand processed is 3,944,228 CY.With a bulk factor of 1.3, this produces 5,127,496 CY. 5,127,496 CY /((6 yr)(350 day/yr)) = 2450 CY/ day or 4900 CY to be removed to the mine waste area. Liquids in the process train will be minimal and the costs of hauling that material off site are within the costs associated with draining tanks.
Water Storage Pond Liner	The 60-mil liner will be removed with the crane and 4 laborers, and placed on a partially loaded trailer load. Because it will be part of another load, no transport fees are included.

Items to be Buried in Place

Gravel from Parking Area next to maintenance shop	The gravel parking area is approximately 2.6 acres in size, covered with 4 inches of gravel, making 1,396 CY to be disposed. Gravel will be pushed to the cleaned-out water storage pond location to partially fill this void.
Rip and Bury Sprung Structure Foundations	Concrete foundations of Sprung Structures will be ripped with a dozer and buried in place.
Reserve Ore, Sand and fine tails, and Reject Materials	Reserve ore, sand and fine tails, and reject ore stockpiles (approximately 60,000 CY, total) from the plant area will be loaded into trucks and hauled to the pit area (prior to final grading and reclaiming) where an opening will be made to place the ore. The excavated overburden will be used to cover these materials.

	Crane					Subtotal		
	(assume 4 hours to load one truck)							
		total hours	equip	labor				
	item	hours	$/hr	$/hr				
	item							
	tanks (22)	12.00	$141.72	$61.75		$2,441.64		
	maint/whse	16.00	$141.72	$61.75		$3,255.52		
	power plant	2.40	$141.72	$61.75		$488.33		
	process train	228.00	$141.72	$61.75		$46,391.16		
	distillation unit	4.00	$141.72	$61.75		$813.88		
	sand dewater unit	3.60	$141.72	$61.75		$732.49		
	water storage pond liner	8.00	$141.72	$61.75		$1,627.76		
	tank farm liner	40.00	$171.82	$61.75		$9,342.80		
							Subcategory total	$65,094
		See Rates sheet: Crane, 65 ton. From Cost Reference Guide (CRG) and Means 2008 data.						
	Laborers			4 laborer hrs		Subtotal		
				for ea crane				
				hour*				
	assumes 4 laborers per crane hour			labor				
	item	total hours		$/hr				
	tanks (22)	48.00		$47.05		$2,258.40		
	maint/whse	64.00		$47.05		$3,011.20		
	power plant	9.60		$47.05		$451.68		
	process train	912.00		$47.05		$42,909.60		
	distillation unit	16.00		$47.05		$752.80		
	sand dewater unit	14.40		$47.05		$677.52		
	water storage pond liner	32.00		$47.05		$1,505.60		
	tank farm liner	160.00		$47.05		$7,528.00		
							Subcategory total	$59,095
		See Rates sheet: Laborers. From Means 2008 data.						
		*Basis for relationship is best professional judgement and past experience.						
	Trucking to dump	(Assumes 35 ton load/truck)				Subtotal		
	item	tons	no. of trucks	# miles (round trip)	$/mile			
	tanks (22)	107	3.0	176	2.04	$1,077.12		
	maint/whse	35	4.0	176	2.04	$1,436.16		
	power plant	20	0.6	176	2.04	$215.42		
	process train	1,995	57.0	176	2.04	$20,465.28		
	distillation unit	30	1.0	176	2.04	$359.04		
	sand dewater unit	30	0.9	176	2.04	$323.14		
							Subcategory total	$23,876
		$/mile from Means 2008 Heavy Construction Cost Data 31 23-23.18- 4700						
	Dump Fees					Subtotal		
	item	tons			$/ton			
	tanks (22)	107			15.00	$1,605.00		
	maint/whse	35			15.00	$525.00		
	power plant	20			15.00	$300.00		
	process train	1,995			15.00	$29,925.00		
	distillation unit	30			15.00	$450.00		
	sand dewater unit	30			15.00	$450.00		
							Subcategory total	$33,255
		Per Greg Jensen, Uintah County Landfill, April, 2008						

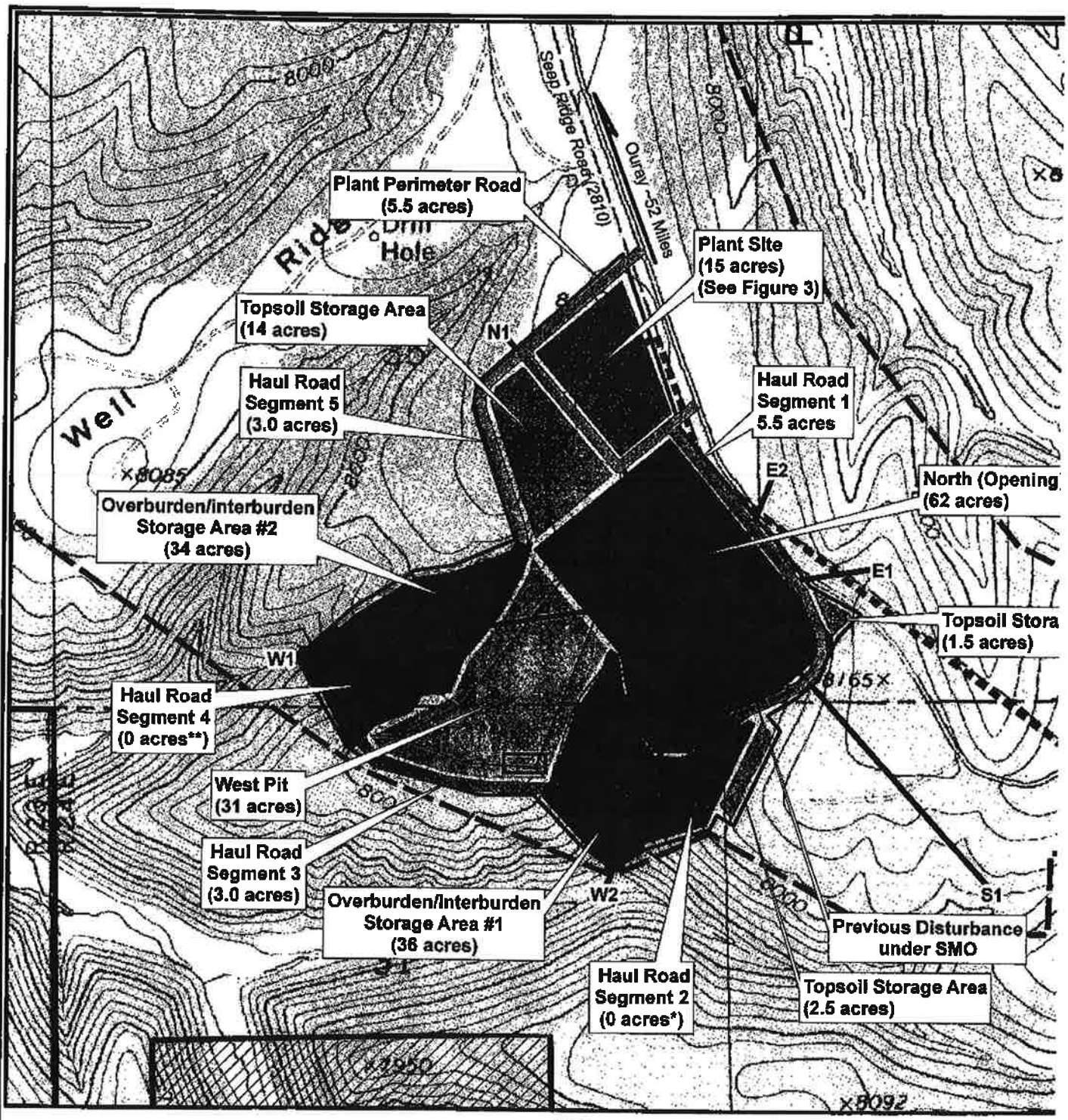
	Push gravel from parking area to storage pond					Subtotal		
		Production		equip	labor			
	Quantity (CY)	(lcy/hr)	total hours	$/hr	$/hr			
	1,396.00	62.25	22.43	$108.89	61.75	$3,827.46		
							Subcategory total	$3,827
		See Equipment: Scrapers; and Rates Sheet: Cat 631 Scraper						
	Move ore-related piles to pit backfill					Subtotal		
		Production		equip	labor			
	Material/quantity	(lcy/hr)	total hours	$/hr	$/hr			
	Reserve Ore - 40,000	255	156.86	$171.82	60.10	$36,378.97		
	Sand-Fine Tails - 10,000	255	39.22	$171.82	60.10	$9,095.90		
	Reject Pile - 10,000	255	39.22	$171.82	60.10	$9,095.90		
	Sand in Process - 4900	255	19.22	$171.82	60.10	$4,457.50	Subcategory total	$59,028
		See Equipment: Dozer, Regrading Dumps; and Rates Sheet: D8 Dozer						
	Rip Concrete foundations* - maintenance/warehouse buildings (20,000 sq ft)					Subtotal		
		Production	total hours	equip	labor			
	area (acres)	(ac/hr)	hours	$/hr	$/hr			
	0.5	0.60	3.33	$108.89	61.75	$568.23		
							Subcategory total	$568
		See Equipment: Dozer, Ripping & pulling; and Rates Sheet: D8 Dozer						
		*Assumption is that concrete is 6 inches thick with standard rebar.						
						1 TOTAL		$244,744
2	Backfilling, grading, and contouring							
	The mine pit will be backfilled to 50-60% of the original volume as part of the mining process using produced sand and cast-back overburden and interburden. The final cut during mining will create a 3:1 slope to blend with surroundings (see cross-sections), thus no backfilling will be required in any area during reclamation.							
	The rough backfilled North and West pit surfaces (93 ac), perimeter road and haul roads segments not integral to oversburden/interburden storage areas (17 ac), and overburden/interburden storage areas (70 ac) will all be finish-graded (minor cut and fill) with a Cat 14 grader to assure the land blends with surroundings. A water truck will be available to suppress dust.							
	Grading/Contouring							
		production		equip	labor	Subtotal		
	area (ac)	ac/hr	total hrs	$/hr	$/hr			
	180.00	3.15	57.14	$68.85	$60.10	$7,368.20		
		See Equipment: Grading; and Rates sheet: Cat 14 Grader						
	Water Truck					Subtotal		
		total	equip	labor				
		hours	$/hr	$/hr				
		57.14	138.91	$60.10		$11,371.43		
		See Rates Sheet: 100,000 gal Water Truck						
						2 TOTAL		$18,740

3	**Soil Material redistribution and stabilization**							
	Approximately 132,250 cubic yards of topsoil and vegetative debris will be redistributed to about a five-inch depth with a scraper and dozer assist, over approximately 195 acres of the mine. Average haul is 600 ft. The 18 acres of topsoil storage areas will not be topsoiled because they will not be stripped of topsoil.							
	Topsoil Replacement	**production**	**Total**	**equip**	**labor**	**Subtotal**		
	Total CY	**cy/hr**	**hours**	**$/hr**	**$/hr**			
	132250	255	518.63	171.82	60.1	$120,280.67		
		Assumes a self-propelled scraper with 1/4 dozer assist. From Means 2008 31 23-16.50-2000						
						3 TOTAL		**$120,281**
4	**Revegetation (preparation, seeding, mulching)**							
	Soil stabilization in preparation for seeding is addressed in No. 3 above. No mulch or fertilizer will be used. All 213 acres affected at the mine area will be seeded with a D6 tractor-pulled broadcast seeder. Seed price quote is from Granite Seed; Lehi, Utah; March, 2008.							
	Revegetation - 213 ac					**Subtotal**		
		area (ac)	**production**	**equip**	**labor**			
			ac/hr	**$/hr**	**$/hr**			
	seed application	213.00	0.75	$61.12	$60.10	$25,619.88		
			cost per acre					
	seed cost ($/ac)	213.00	697.50			$148,567.50		
		See Equipment: Dozing, Seeding; and Rates Sheet: D6 Dozer						
						4 TOTAL		**$174,387**
5	**Safety gates, berms, barriers, signs, etc.**							
	A highwall safety berm, extending up to 2,000 linear feet, 4 feet high and 12 feet wide, may be in place on the side of the backfilled pit when reclamation commences. It will be blended into the regraded pit with a D8 dozer.							
	Approximately 4,000 feet of fence with a wooden top rail (as per DWR request) will be in place between the mine and Seep Ridge Road, as well as two metal safety gates, and safety signs. These will be removed once reclamation is completed and vegetation is growing.							
	Safety fences					**Subtotal**		
		# feet removed	**$/lin feet**					
		4,000.00	$2.69			$10,760.00		
		From Means 2008 02 41 13.80 1650						
	Highwall safety berm							
			production	**equip**	**labor**	**Subtotal**		
		CY material	**CY/hr**	**$/hr**	**$/hr**			
		1,778	62.5	61.12	60.10	$3,448.47		
		From Equipment: Dozing, Regrading Dumps; and Rates Sheet: D8 Dozer						
						5 TOTAL		**$14,208**
6	**Demolition, removal and disposal of facilities/structures, regrading/ripping of facilities areas**							
	Buildings to be demolished			**volume**	**demolition**		**Subtotal**	
		area (sq ft)	**height (ft)**	**(cu ft)**	**$/cu ft^**			
	warehouse	10,000.00	20.00	200,000.00				
	maint. Shop	10,000.00	20.00	200,000.00				
		Total Volume (cu ft)		400,000.00	0.31		$124,000.00	
		Demolition $/ cu ft from Means 2008 02 41-16.13-0100						

	Removal and disposal is included in item #1 above; none of these structures will be buried.							
	Ripping concrete in place, burial, and ripping remaining facilities area						Subtotal	
			production		equip	labor		
		Acres	ac/hr	total hrs	$/hr	$/hr		
		13.00	0.60	22	108.89	61.75	$3,697.20	
		See Equipment: Dozing, Ripping; and Rates Sheet: D8 Dozer						
						6 TOTAL		$127,697
7	Regrading, ripping of waste dump tops and slopes							
	Grading of overburden/interburden storage areas will entail reworking approximately 132,259 cubic yards of material to bring these areas to a 3:1 slope. These areas will not need to be ripped as they will not be compacted. A trackhoe, backhoe, and dozer will be utilized.							
	Regrading of waste dumps						Subtotal	
			production		equip	labor		
		Cubic Yards	ac/hr	total hrs	$/hr	$/hr		
		132,259	62.25	2,124.64	108.89	61.75	$362,548.57	
		See Equipment: Dozing, Regrading Dumps; and Rates Sheet: D8 Dozer						
						7 TOTAL		$362,549
8	Regrading/ripping soil stockpiles, pads and other compacted areas							
	Soil stockpile areas (18 acres) will not need to be regraded as the underlying surface has not been disturbed, but will be ripped; the 15-acre plant site will also be ripped. These total 33 acres will be ripped to relieve compaction using a Cat 14 grader. Regrading of surfaces is included in Bullet 2 above.							
	Ripping topsoil stockpile areas							
			production		equip	labor	Subtotal	
		Acres	ac/hr	total hrs	$/hr	$/hr		
		33.00	3.15	10.48	108.89	61.75	$1,788.31	
		See Equipment: Grading; and Rates Sheet: Cat 14 Grader						
						8 TOTAL		$1,788
9	Ripping roads							
	Non-integral to overburden/interburden storage areas							
	Ripping roads							
		area (ac)	production		equip	labor	Subtotal	
			ac/hr	total hrs	$/hr	$/hr		
		17.00	0.60	28.33	$108.89	$61.75	$4,834.23	
		See Equipment: Dozing, Ripping; and Rates sheet, D8 Dozer						
						9 TOTAL		$4,834
10	Drainage Reconstruction							
	The headwaters of two ephemeral drainages affected by mining will be filled with overburden/interburden storage areas. Rip-rapped and energy dissipators will be constructed during mining to protect these areas from erosion (See Erosion and Sediment Control Plan). These are permanent structures. No drainage reconstruction will be required during reclamation.							

11	**Mulching, fertilizing and seeding the affected areas**							
	No mulch or fertilizer will be used in reclamation efforts. All 213 affected acres will be seeded. See No. 4, above.							
12	**General site clean up and removal of trash and debris**							
	Trash removal will occur after all buildings and facilities are removed; it will involve collection of all refuse, litter, stray metal, pipe, wood, insulation, and other debris. The 213-acre area will be inspected by 3 laborers with a pick up truck. All trash will be collected, loaded onto haul trucks, and transported to the Uintah County Landfill for proper disposal. Trash volumes and weight are expected to make up only a small part of another existing load, thus no cost for transport or disposal is included here.							
	Trash removal						**Subtotal**	
		# acres	**pick up 1.6ac/hr**	**labor $/hr**	**no. of laborers**			
		213.00	1.60	$47.05	3		$18,790.59	
		See Rates sheet, Laborer						
						12 TOTAL		**$18,791**
13	**Removal/disposal of hazardous materials**							
	Any fuels remaining on site would be used to fuel equipment used in reclamation work. Most fuel, oil, lubricants will be removed by Tri-State Recycling at no cost, based on quote from Tri-State, March 2008.							
	A charge to remove partial containers and small amounts of hydrocarbon wastes will be charged.							
	One trip will be required. No Hazardous materials are stored on site.							
	Removal of hydrocarbons						**Subtotal**	
		cost/mile	**miles, round trip**					
		$1.56	176				$274.56	
		Based on quote from Charles Martin, Tri- State Recycling, April 2008						
						13 TOTAL		**$275**
14	**Equipment Mobilization**							
	This bullet includes removal (demobilization only) of abandoned mining equipment from the site.							
			mob	**demob**		**Means 2008 reference number**		
	Reclamation Equipment	D8 dozer	$355.00	$355.00		01 54-36.50-0100		
		950 Loader	$355.00	$355.00		01 54-36.50-0100		
		track hoe	$217.00	$217.00		01 54-36.50 -0020		
		Cat 14 grader	$355.00	$355.00		01 54-36.50-0100		
		crane	$405.00	$405.00		01 54-36.50- 2100		
		631 scraper	$530.00	$530.00		01 54-36.50 -0700		
		Water truck	$355.00	$355.00		01 54-36.50-0100		
		D6 Dozer	$355.00	$355.00		01 54-36.50-0100		
		Seeder, Manure Spreader		(piggyback with other equipment - no addt'l cost)				
		Semi and Low-boy trailer		(used to mobilize other equipment - no addt'l cost)				
	Mining Equipment	Surface Miner		405.00		01 54-36.50- 2100		
		Rock Drill		405.00		01 54-36.50- 2100		
		D8 dozer		$355.00		01 54-36.50-0100		
		950 Loader		$355.00		01 54-36.50-0100		
		track hoe		$217.00		01 54-36.50 -0020		
		Cat14 grader		$355.00		01 54-36.50-0100		
		Water truck		$355.00		01 54-36.50-0100		
		35 Ton haul trucks(4)		1,420.00		01 54-36.50-0100		
		Total	$2,927.00	$6,794.00				
						14 TOTAL		**$9,721**

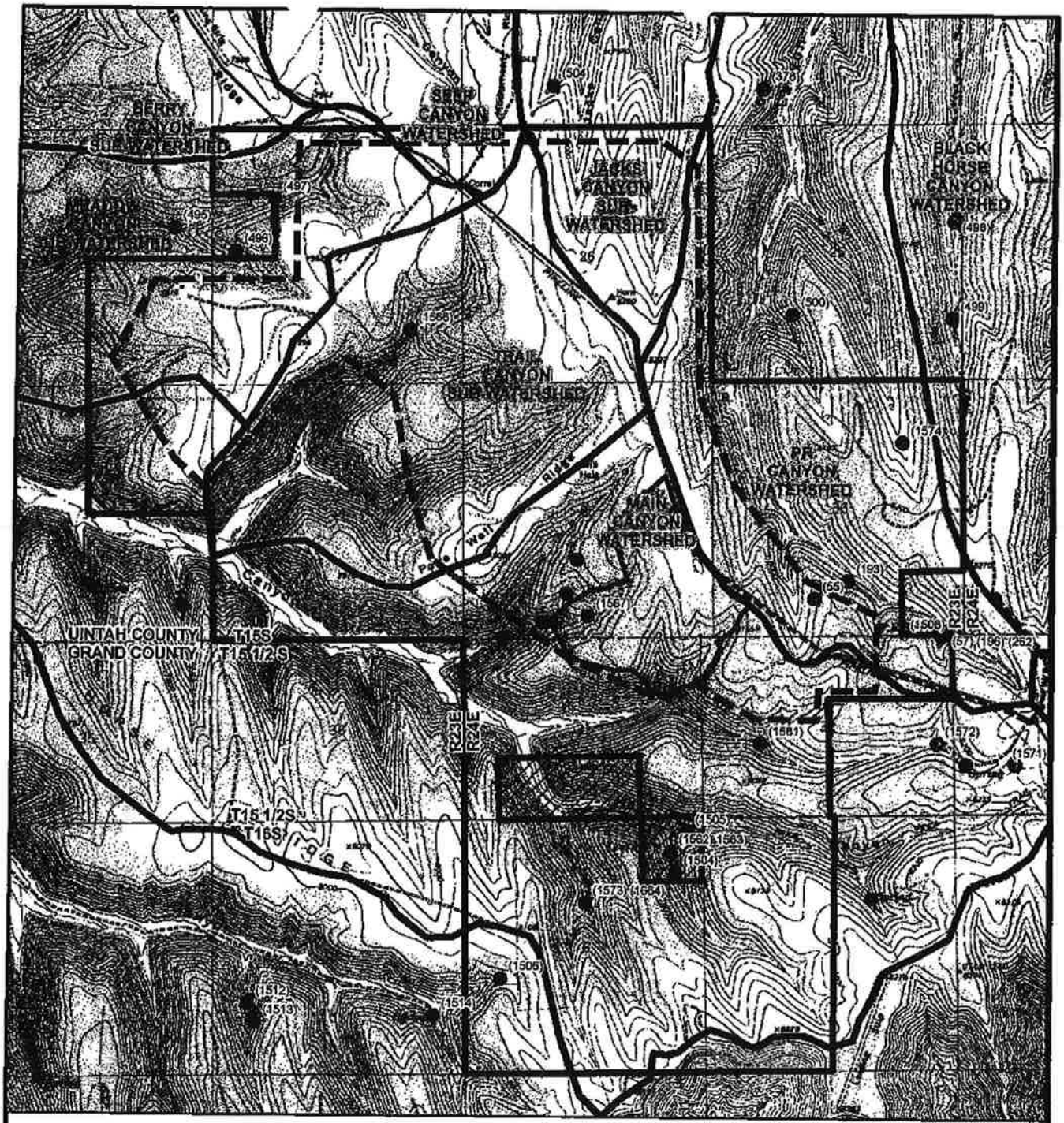
15	RECLAMATION BASE COST							$1,098,014
15.1	Supervision during Reclamation (10% of Reclamation Base Cost)							$109,801
15.2	Revegetation Monitoring & Weed Control							
	Assume two trips per year, 3 years, 10 hours per trip							
	labor $/hr	truck/hr	hours	gas $100/trip		subtotal		
	75.00	30.00	60.00	600.00		6,900.00		
	Administrative costs equal to 15 percent of subtotal					1,035.00		
	Weed control costs equal to 25 percent of revegetation costs (in category 4)					37,141.88		
	Second seeding costs equal to 50 percent of revegetation costs (in category 4)					74,283.75		
		Total				119,360.63		
		Based on average consultant rates for technicians, and rental vehicle rates for SLC area, 2008						
						15.2 TOTAL		$119,361
16	SUBTOTAL (2)							$1,327,176
16.1	Contingency (5%)							$66,359
17	SUBTOTAL (3)							$1,393,535
17.1	Escalation (for 5 years at 3.8% per year)							$285,675
18	GRAND TOTAL							$1,679,210
	GRAND TOTAL ROUNDED							$1,679,200



Legend

- Earth Energy Lease Boundary
- Property Excluded from Lease
- Affected Area
- Study Area Boundary
- Cross Section Line
- Water Pipeline (Water line not part of this NOI - permitted under Exploration Notice #E0190053)
- Previous Disturbance under SMO
- Plant Site
- Topsoil Storage Areas
- West Pit
- Overburden/Interburden Storage Areas
- North (Opening) Pit
- Collection Sump (inflow)
- Rip-Rap Energy Dissipater
- Rip-Rap Armoured Channel Bed
- Plant Permimter Road
- Haul Road Segment 1
- Haul Road Segment 2*
- Haul F
- Haul F
- Haul F
- *Acre
- **Acre

drawings\Earth Energy\Fig2 Mine Surface Facilities Map and Land Status Map rt.mxd



Legend

- Earth Energy Lease Boundary
- Property Excluded from Lease
- Study Area Boundary
- Affected Area
- Watershed Boundary
- USGS Mapped Spring
- Water Right Filing for Seep or Spring
- Surface Water Right Point of Dirversion
- Seep Identified in Field
- (1506) Water Right Number

N

1,000 0 4,000 Feet

1,000 0 1,000 Meters

Contour Interval 40 Feet

EARTH ENERGY RESOURCES, INC.

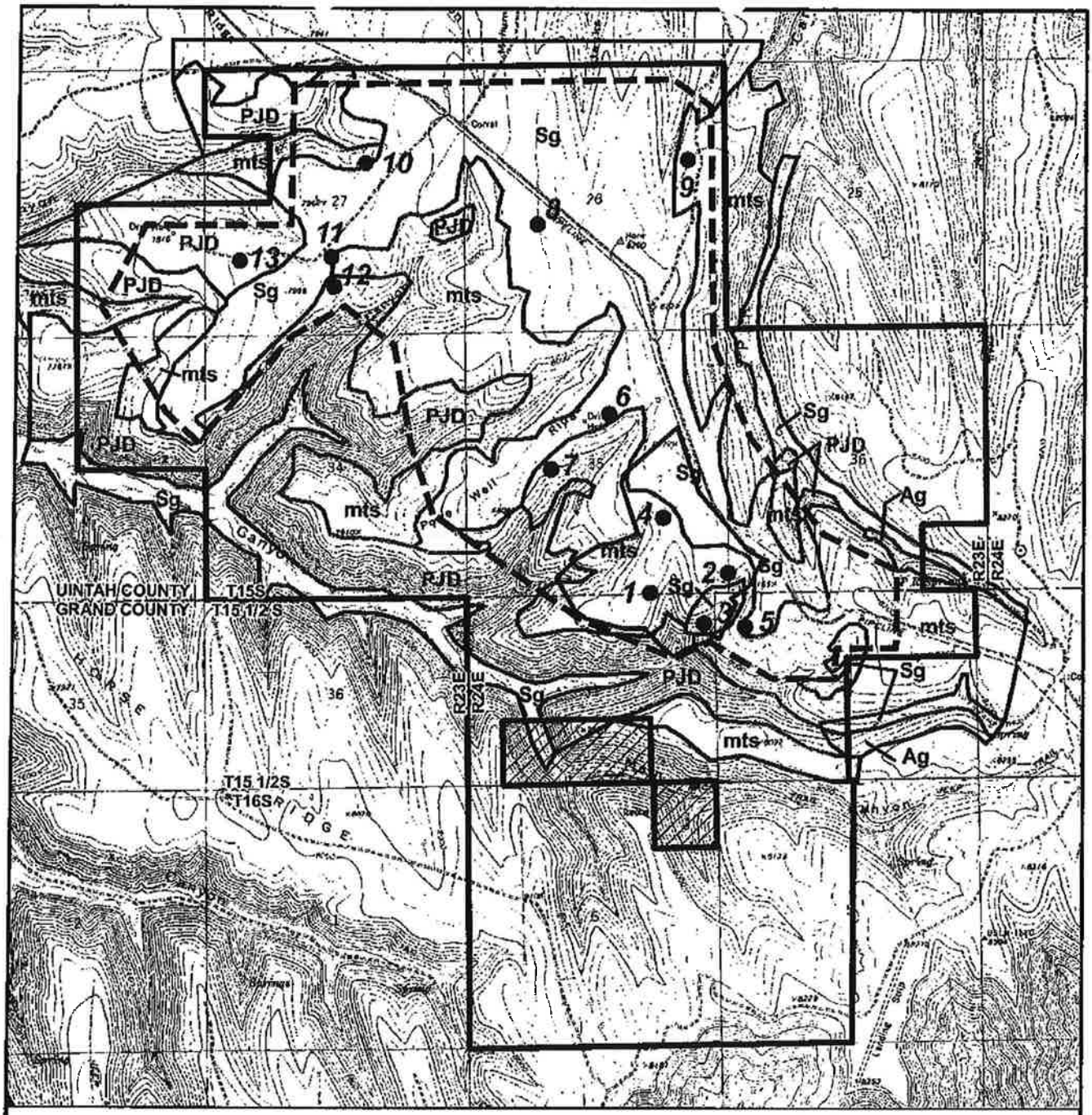
PR SPRING TAR SANDS DEVELOPMENT PROJECT

FIGURE 7
WATER FEATURES

jbr environmental consultants, Inc.

DESIGN BY	DRAWN BY	SCALE	DATE DRAWN	REVISIONS
KK	CP	1:36,000	9/11/07	4/03/08
				10/31/08

drawings\Earth Energy\Fig7 Water Features



Legend

- Earth Energy Lease Boundary
- Property Excluded from Lease
- Study Area Boundary
- Affected Area
- Limit of Vegetation Survey
- Vegetation Community Boundary
- • 1 Quadrat Location and Number

Vegetation Types

- Sg Sagebrush - grass (1638 acres)
- mts mixed tall shrub (1482 acres)
- PJD Pinyon-Juniper-Douglas fir (1203 acres)
- Ag Aspen glade (not sampled) - (43 acres)

1,000 0 4,000 Feet

1,000 0 1,000 Meters

Contour Interval 40 Feet

N

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FIGURE 8
VEGETATION MAP

jbr environmental consultants, inc.

DESIGN BY	DRAWN BY	SCALE	DATE DRAWN	REVISIONS
MS	CP	1:36,000	9/11/07	4/02/08
				10/31/08

drawings\Earth Energy\Fig8 Vegetation Map.mxd

Legend

- Earth Energy Lease Boundary
- Property Excluded from Lease
- Study Area Boundary
- Affected Area

Reclamation Treatments

- Regrade, Topsoil, and Seed (163 acres)
- Rip and Seed (18 acres)
- Rip, Topsoil, and Seed (15 acres)
- Regrade, Rip, Topsoil, and Seed (17 acres)
- Reclamation Contours

2,000 0 2,000 Feet

500 0 500 Meters

Contour Interval 40 Feet

N

EARTH ENERGY RESOURCES, INC.

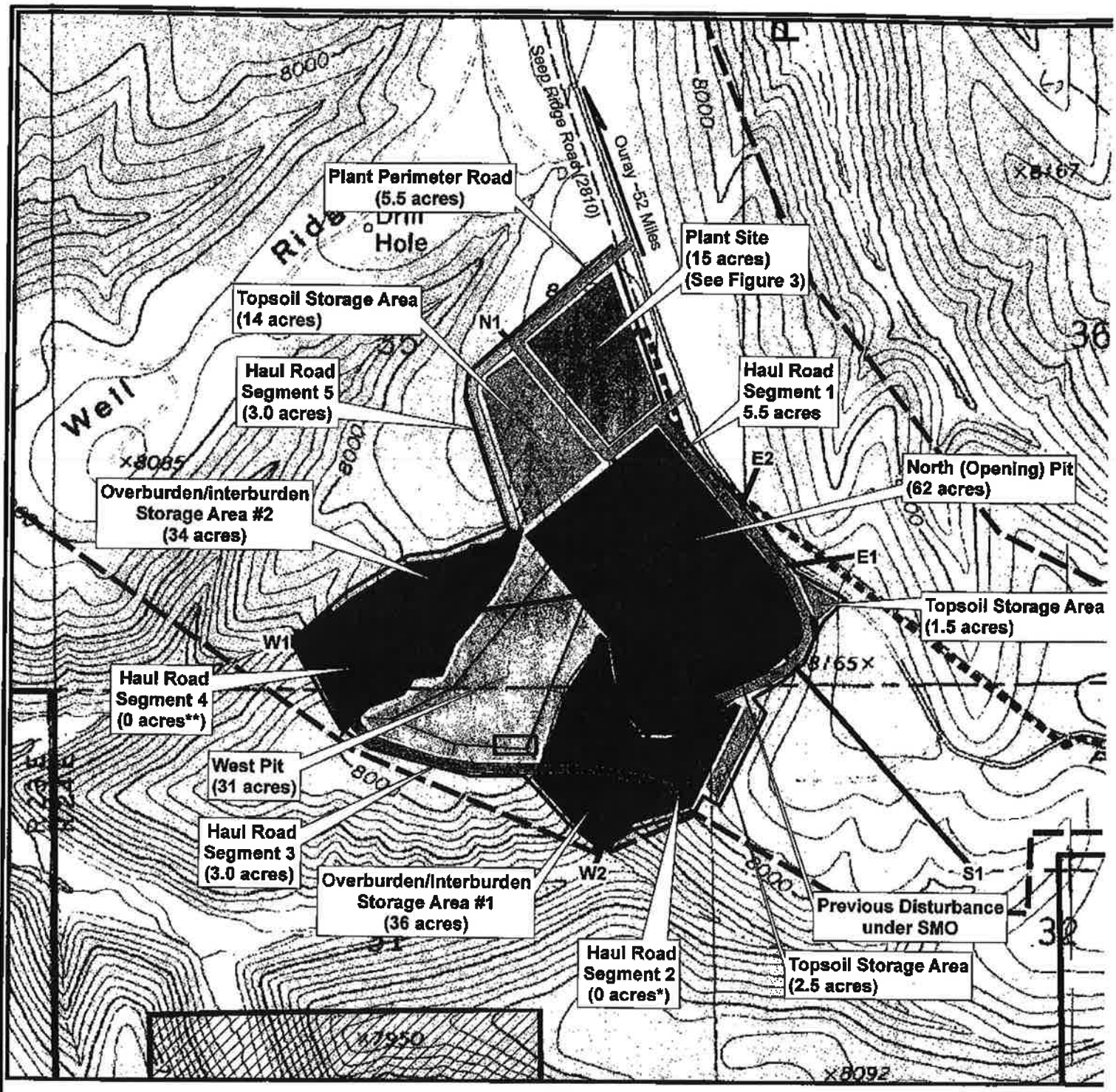
PR SPRING TAR SANDS DEVELOPMENT PROJECT

FIGURE 9
RECLAMATION MAP

jbr environmental consultants, inc.

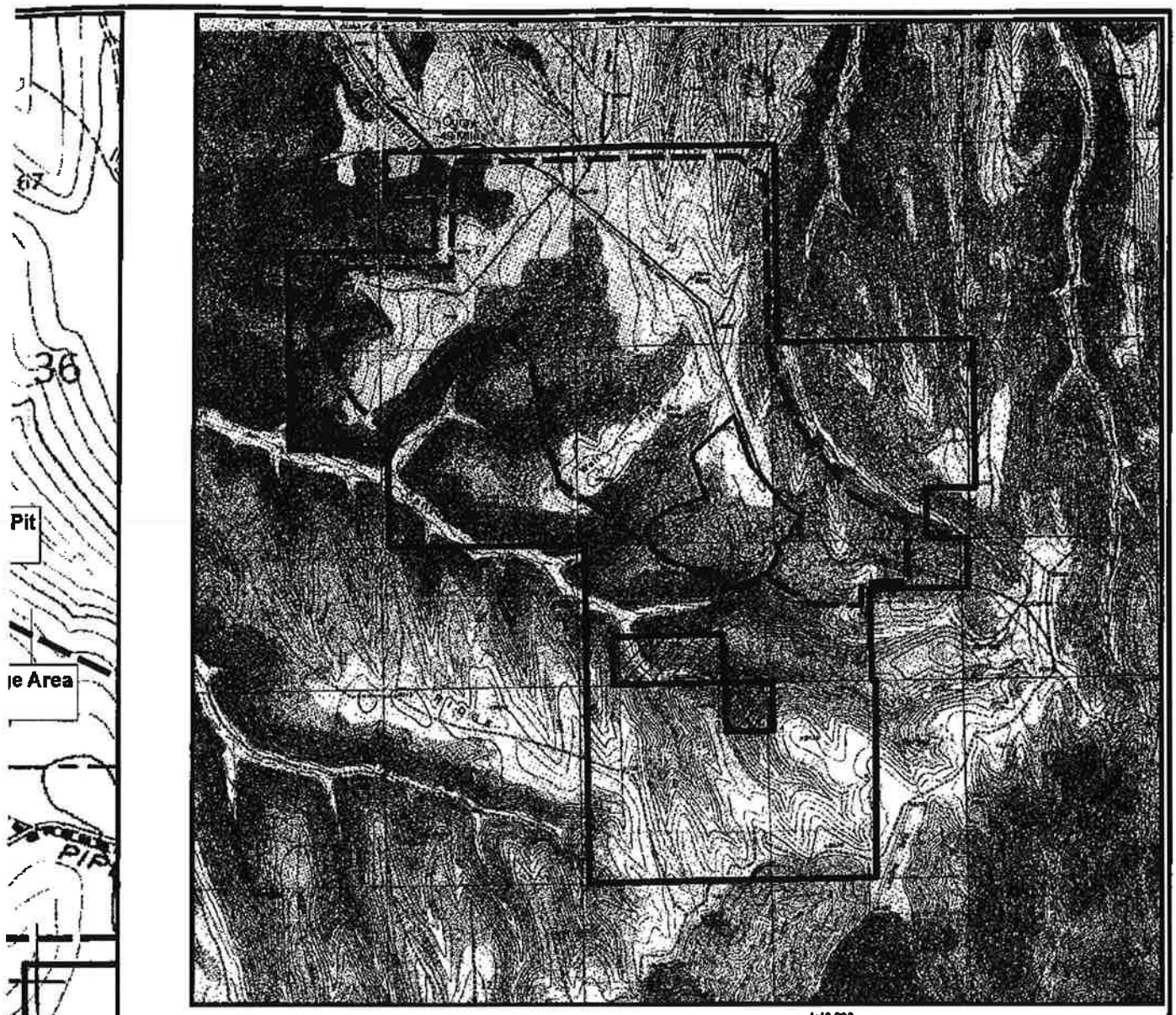
DESIGNED BY	DRAWN BY	SCALE	DATE UPDATED	REVISIONS
KK	CP	1:24,000	9/14/07 4/02/08 10/31/08	

drawings\Earth Energy\Fig9 Reclamation Map r1.mxd



Legend

- Earth Energy Lease Boundary
- Property Excluded from Lease
- Affected Area
- Study Area Boundary
- Cross Section Line
- Water Pipeline (Water line not part of this NOI - permitted under Exploration Notice #E0190053)
- Previous Disturbance under SMO
- Plant Site
- Topsoil Storage Areas
- West Pit
- Overburden/Interburden Storage Areas
- North (Opening) Pit
- Collection Sump (inflow)
- Rip-Rap Energy Dissipater
- Rip-Rap Armoured Channel Bed
- Plant Perimiter Road
- Haul Road Segment 1
- Haul Road Segment 2*
- Haul Road Segm
- Haul Road Segm
- Haul Road Segm
- * Acreage Interga
- ** Acreage Integr



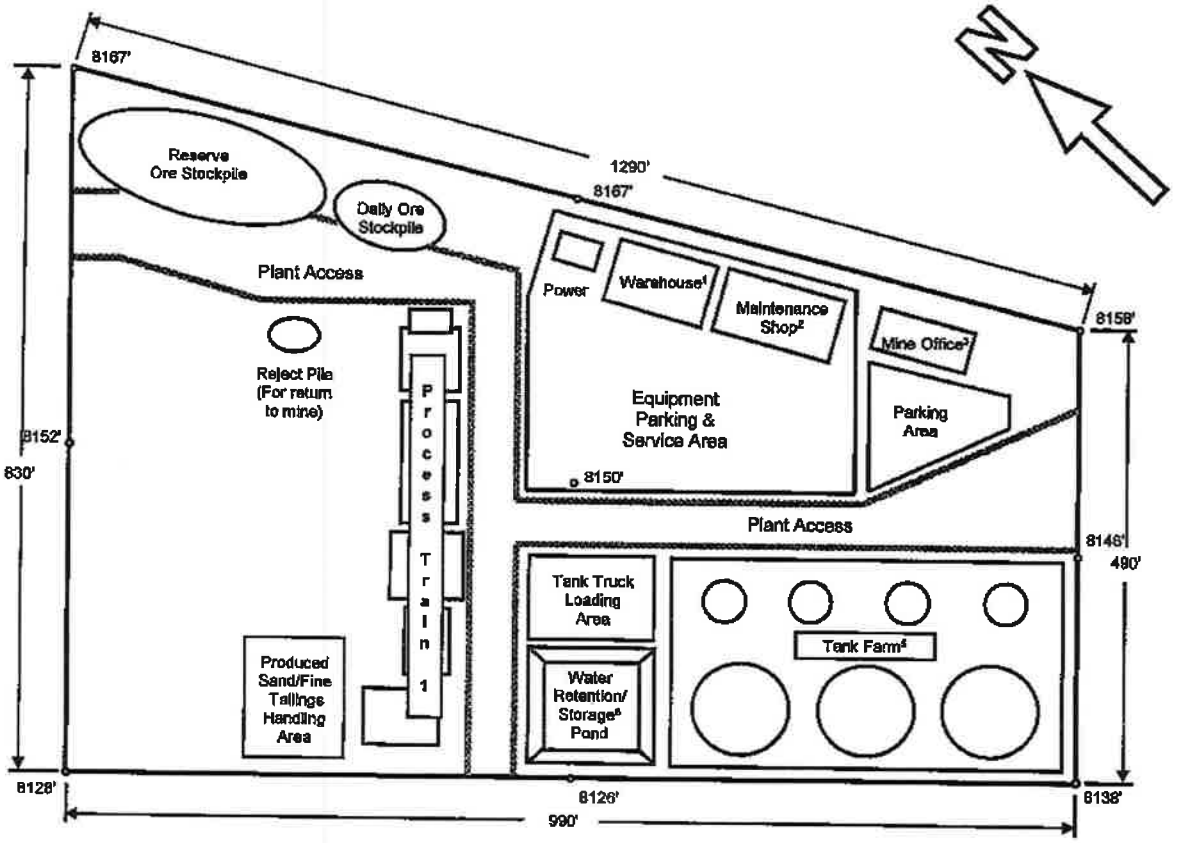
oad Segment 3
oad Segment 4**
oad Segment 5
ige Intergal with Overburden/Interburden Sorage Area #1
age Integral with Overburden/Interburden Storage Area #2

N

EARTH ENERGY RESOURCES, INC.
PR SPRING TAR SANDS DEVELOPMENT PROJECT

FIGURE 2
MINE SURFACE FACILITIES
AND LAND STATUS MAP

DESIGN BY	DRAWN BY	SCALE	DATE DRAWN	REVISIONS
LM	CP	As Shown	9/11/07	3/31/08
				5/08/08
				10/30/08



NOTES:

1) "Sprung type" structure on concrete pad
2) "Sprung type" structure on concrete pad
3) "Atco type" modular office (2-3 unit) on gravel pad
4) All process equipment skid-mounted c/w sill plates
5) Actual size and no. of tanks may vary from that shown
6) All site drainage to be collected in retention/storage pond
7) Area of Plant Site: ~15 acres
8) Spot Elevations: ft. ASL (from BigTopo)

Earth Energy Resources

Figure 3

PR Spring Plant Site - Plot Plan

Preliminary Equipment Layout - Rev.4

Drawing Not to Scale

Drawn by: TJW **Date: Feb 13, 2008**